Go To Work!

WE have come into the last quarter of this year with the business picture clearing.

Business sentiment during the past third quarter has been poorer than actual business conditions.

Actual business facts and figures have not justified the blue funk into which business sentiment slumped during August and September.

Business men have been crabbing too much. They have spent too much time theorizing about the country's welfare and neglecting their own immediate opportunities. They have indulged their theories, coddled their fears and petted their inhibitions, instead of going to work.

What the United States needed was not "a good five-cent cigar," but a powerful business purgative and they got it. We all know we needed it. It has circulated throughout our entire business system and the time has come for us to get up, buckle up our belt, adjust to the cleaned-up condition, and go to work.

For there is much work to do.

Never since the depression began back in 1929, have business men had such a challenge nor been presented with such an outstanding opportunity for recovery.

One hundred and twenty-five million people in the richest country on earth, possessing the highest standard of living in all history, are facing to-day an unprecedented shortage of all those supplies and commodities necessary to the maintenance of their living.

They refuse to be deprived of these commodities; they must have them and they are going to get them.

An unprecedented drought has curtailed their basic living supplies, and an unprecedented curtailment in factory production has cleaned up all of their stocks and reserves of commodities necessary to their comfort and customs. Beginning right now, this month of October, they shall start replenishing in all divisions.

Therein lies an incomparable opportunity for American business.

What cares Mr. Johnny Q. Consumer whether the national budget is balanced or not when his usual amount of necessary supplies for himself and family are scarce.

He is going to buy. He proposes to lay in a supply for the fall and winter. He always has and he always will, irrespective of how the fall elections turn out.

For Mr. Johnny Q. is wise to many of the important business facts extant to-day. He knows, for instance, that more labor is employed and better paid than a year ago. He knows that in spite of the drought, farm incomes are up some 20 per cent higher than a year ago. He knows that the banks are filled with cash; that we have bullion enough in the government vaults to cover every dollar in circulation with one hundred cents in gold. He knows that the labor troubles are in process of solution and stabilizing. He believes progress is in the making. He knows that the Chamber of Commerce of the United States, the American Manufacturing Association, the Advisory Board of the Reserve System are all out to-day working hard and intelligently to co-operate with the

Government to better business and underwrite recovery. He was afraid, but now his fears are vanishing. But the one thing he is dead certain about at this present moment is the fact that meats, vegetables, canned goods, flour, feeds, clothing and all supplies are rising in price, and he has no stock of them. He's out to buy.

These are facts. This is a fact-finding day and the facts are the elements which forecast and determine future operations.

In the face of these facts, what cause of concern have business men as to the immediate future? With shortage of supplies, a rising market, a tremendous, potential, populace prepared to purchase, what more can business men ask?

And as business men, is it not our primary duty at this time to cease carping about the eventual future of the United States; its ultimate form of government and future position in the galaxy of nations; dismiss our fears, junk our political theories and take off our coats and go to work harvesting this wonderful crop of fall business which lies immediately before us?

Isn't it about time to quit asking that President Roosevelt do all the work in the way we think he should do it, and get to work co-operating with all the fundamental forces that he has set to work in our behalf and help him to consummate our success? We think so.

We're going to work!

Need for New Equipment

HAVE you kept in touch with recent progress in the development of equipment for use in pulp and paper making? Are you familiar with every new or improved device that has been placed on the market within the past twelve months and which should prove of interest to you or to your organization? If you are familiar with all of these developments, have you utilized this knowlege to the greatest possible benefit of your company? Have you ascertained how plant processes might be improved, working conditions made better, or quality of products enhanced through the installation of some of them?

If you are in doubt or feel inclined to believe that there might be some item of new equipment with which you are not familiar, may we suggest a careful perusal of an article on this subject in this issue? In this article is presented an extensive resumé of many of the developments of manufacturers who have been active in bringing out such equipment. No attempt has been made to make this resumé all inclusive. Such a task would prove a practical impossibility, but an effort has been made to show the wide scope of the activity of equipment manufacturers and it is hoped that some item or perhaps a number of them may be found of sufficient interest to command your attention and serious consideration to possible installation; or to make a more detailed search to ascertain if there might be other developments of more direct and practical interest to you.

Surely manufacturers who have had the faith during trying times to continue with their development work and to bring out new equipment for the benefit of the pulp and paper manufacturer are to commended. It is just such faith that will result in improved business conditions throughout all industry.

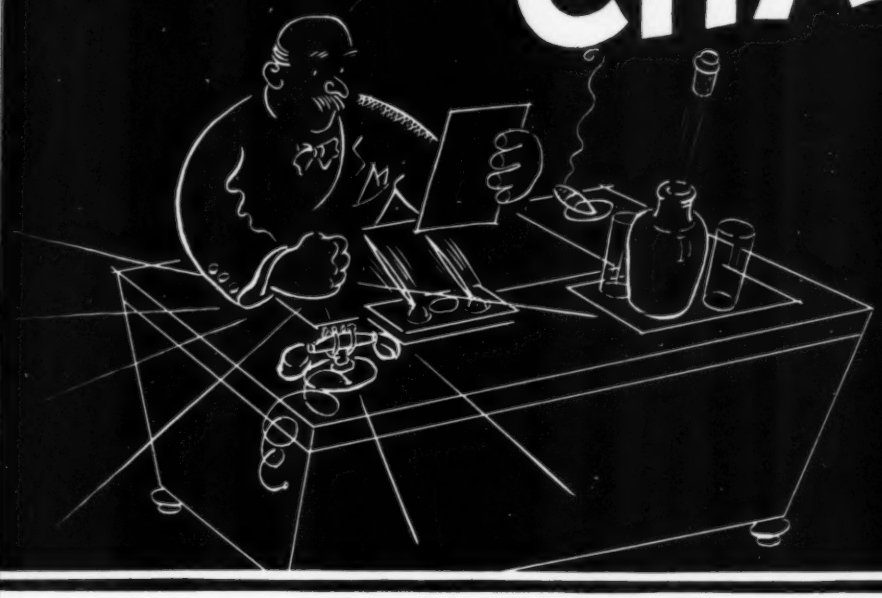
Congratulations! Pacific Coast T.A.P.P.I.

THE nineteenth annual fall meeting of the Technical Association of the Pulp and Paper Industry is now history. It was held from September 10 to 13 inclusive in Portland, Oregon, with the Pacific Section of T.A.P.P.I. acting as host. Never before had the Association gone farther west than the State of Wisconsin for any of its fall meetings. For this reason, it is believed that the membership of the Pacific Coast Section of T.A.P.P.I. is deserving of no little praise. In the first place, they are to be complimented for being able to sell the parent association on the feasibility of such a meeting. Then they are to be congratulated for the effectuation of a most successful convention.

It should be appreciated that the Pacific Section is only a little over five years old. The section was organized in June 1929 and held its first meeting the following October. From only a mere handful at this first meeting the section has grown into an organization which at the time of the recent meeting could claim ninety-three active members and twenty-five affiliate members.

Congratulations, therefore, are extended to those who constitute this membership and more specifically to the committee chairmen, committees, and executives of pulp and paper mills or allied enterprises who in any way took an active part in making this first national meeting of T.A.P.P.I., in fact, international meeting, on the Pacific Coast a success. May they receive such inspiration and satisfaction as comes from a job well done and perhaps a vision of even greater things for tomorrow.

"Oh Yes~ CHAINS"



Quite often Chains are treated in that humor. Nobody thinks about them until all else is attended to . . then it is, "Oh, Yes—Chains."

Yet Chains are a vital part of almost every material handling problem in the Pulp and Paper industry. They transmit power . . are the fundamental basis of many types of conveyor . . act as conveyors in their own right.

Jeffrey Chains have served Industry for over a half century. In fact, Jeffrey conceived and developed the Steel Thimble Roller Chains, Hercules, Flat and Round Link and many other popular types. Chains were our earliest product . . we know how to make them exceptionally well.

There is a type and size of Jeffrey Chain to meet any requirement you may have. You can't go wrong when you select Jeffrey Chains.

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MATERIAL HANDLING EQUIPMENT

An Offensive Is the Best Defensive

By WILLIAM SIBLEY

ON TWO or three occasions, during the past eleven years that I have been writing in this space, I have expressed the thought that the paper and pulp industry might vastly enlarge its volume of business and give increased security to its profits through co-operatively sponsored research and publicity.

Two or three weeks ago I was reminded of what I had said along these lines through learning of what might be an analogous situation in an entirely foreign industry—in my mind, a situation the paper industry might well study in the light of its own possibilities. Let me tell you about it.

We have in this country a comparatively small number of manufacturers who produce and market "frit," the substance which, when applied and fused on steel, becomes porcelain enamel. Their market lies almost wholly with those manufacturers who make ranges, stoves, sanitary equipment, kitchen utensils, refrigerators, washing machines, store signs, soda fountains, etc. A comparatively small market supporting a comparatively small industry. And up to a couple or three years ago they felt very secure in their business, since there seemed to be no substitute material which would capably withstand the heat or the cold that porcelain enamel could endure.

But not long ago this entire industry was shocked and dismayed to learn that a prominent manufacturer had recently developed a finish which would almost, if not quite, do the porcelain enamel job on many appliances such as refrigerators, electric ranges, etc. This new invader, this unlooked-for competition, threatened the upset of two (and perhaps more) large "frit" markets. To permit the development and progress of this new competitive finish would mean the total loss of several valuable markets.

So the frit manufacturers, through their association, held a conclave, with the result that a so-called "Educational Bureau" was established within their association; this bureau being divided into four divisions: Technical, Market Research, Contact, and Advertising-Sales Promotion. Appropriations were set up for the support of these four divisions of group activity, and already they are doing work and making their voices heard to the pronounced benefit of their industry.

Not only has the Advertising and Sales Promotion division undertaken to carry the message of porcelain enamel merits to the members of the various industries that use it; but the Technical and Market Research divisions have uncovered some amazing potentials. They have found, for instance, that their product (porcelain enamel) works to advantage in the construction of ash and coal handling equipment in steel and coke plants! An unheard-of market, one individual installation of which equals the tonnage of frit needed for literally hundreds of washing machines. Another entirely unthought-of use for porcelain enamel has been the suction-valves on the oil pumps which are sunk thousands of feet into the ground, at the bottom of an oil-well hole! And while this technical research and market development work is going on, the Advertising and Contact divisions are not only holding their threatened markets but entrenching themselves with increased volume.

All of which is interesting to us—only if we consider the experience in the light of possibilities within the paper industry. There is nothing in my mind which would cause me to shout "Wolf! Wolf!" It might readily be that no adequate substitute for paper will ever be developed. But although science has gone far, it has only just started. What will be developed in the future no one can predict. Cellophane has cut deeply into display paper tonnage; while the almost simultaneous development of rayon has greatly aided some of our pulp plants.

With chemistry, physics, electricity and engineering performing such development feats as they are, this is no time to sit back and falsely think that our product is totally indispensable. With research doing so much for the development of new applications and new markets, there is every reason in the world for this industry to support an elaborate research committee for the benefit of the entire industry? How do we know that paper will not make a better locomotive drive-wheel tire than steel, a better pavement than asphalt, a better rug than wool? How do we know the depths of public ignorance regarding our product and its uses?

An offensive is the best defensive.

ADVERTISING PAGES REMOVED

THE PAPER INDUSTRY

A MONTHLY EDUCATIONAL JOURNAL

Technical Control in Book Paper Mills

By W. K. KIDDER

IF one will reflect for a moment on the various types of technical control in book mills of this country, it will be realized that this division of paper manufacturing has been influenced by many factors. Chief among these factors, in the order of their importance, are:

1—Managerial attitude toward technical control.

2—Co-operation between technical and operating departments.

3—Authority delegated by management to technical department.

4—Types of paper made.

The attitude of the management toward technical control is the foundation upon which rests the success of such a department. Upon this factor depends the scope of the department, the type and calibre of the men employed, and finally in a large measure, the accomplishments and progress made for the mill and its products through the medium of this scientific work. Except in a few cases, the paper mill laboratory in all its various forms has come into existence within the last twenty years, but there are still a few mills which either do not have any technical staff or have only just recently added such a department to their organizations.

Laboratory Classification

From a critical study of this managerial attitude it is believed that the field may be divided into three distinct classes of laboratories. In the first class, and fortunately there are very few of this type, the management feels that it should have a laboratory in order to "keep up with the Joneses," but it does not feel that it is of any value with reference to mill operation, and therefore gives no consideration to the results of the work done. Only a meager attempt is made to control the manufacture of the product, and apparently the laboratory is primarily a show place for customers, if and when they visit the mill.

The second class consists of those laboratories the management of which believes in technical control and development work, but feels that this can be accomplished with a small staff and that the expense of maintenance is a major factor and should be kept at a minimum. In short, the management depends on this department, desires the information it can give, and yet appropriations for new equipment, additional staff members, and the like are not easily obtained. Under these conditions, a reasonable control of the product is maintained, some development work on processing methods and new products is done when time permits, and the department functions reasonably well with the other divisions of the organization.

A complete technical division set-up, usually divided between control, research, and development will be found in the third class. In this case, the management fully realizes the benefits derived from such an organization and insists that the technical staff be maintained at a high standard and given complete authority to carry on whatever work is necessary or advisable. A large enough staff is maintained to exercise complete control on manufacturing processes and on the quality of the finished product. In addition, the research division, set up as a separate unit, is not interrupted by the numerous details of manufacturing and sales problems; and it is provided with means to carry on an extensive study of any problem or idea which may come before it.

The large fund of information, and the numerous patents granted in the past five years, due to the work of the laboratories in the latter class, is concrete evidence of the value of the technical division in its proper form.

Technical and Operating Staff Relationship

No technical division, regardless of its efficiency, can be successful unless there is a proper spirit of co-

operation between it and the operating division. Lack of co-operation has been found to exist because the wrong type of men have been placed in charge of technical work. No matter how able the men, or how splendid their thoughts and ideas, the operating department does not accept suggestions from them in the proper manner if there is a clashing of personalities. Under these conditions, an atmosphere is created, wherein the operating men feel that the technical man is playing the role of detective, and spends his time spying around the mill to find conditions which he can criticize, and thus show up the operating man. Likewise, the technical man feels that the operating division is narrow minded and not open to suggestions, with the result that the real value of the technical department is not demonstrated.

Another factor, which can be a serious handicap is the somewhat frequent practice of using the technical division as a training school for new men in the organization, and for those whom the management does not know where else to place. A wealth of information can be gained through a laboratory position because it provides a sort of concentrated schooling for one who is new to the organization. It is, however, a definite hindrance to this division and to the spirit of co-operation to bring in these outsiders for a short period, and then place them elsewhere. The other condition exists when some one in the organization, or a friend, requests that his son, or nephew, or what not, be put to work. Lacking an opening best fitted to the type of man being placed, the technical man is asked to put him to work. The net result is that he is forgotten and soon has become a permanent fixture, taking up space and usually not being fitted for the work, he accomplishes very little. The reaction of the operating men to this sort of performance is very obvious.

It is important then that the personnel of the technical division fit in with the operating staff, and enjoy the same confidence that the operating men do between themselves.

The scope of authority granted the technical division is another factor influencing its success, and varies from one mill to another. On the one extreme, the operating men and the management make the final decisions with reference to the results obtained from the technical work on raw materials, methods of manufacture, and quality of the finished product. In the opposite case, the technical staff makes the decisions on these same questions in preference to the other divisions.

Extensive control and research work can usually settle, without any doubt, the answers to the above questions. Therefore, the authority delegated is usually commensurate with the development of the department.

At this point it is well to consider the investigation of criticisms made by the customer. The ideal situation is to have both the technical man and the superintendent who made the paper investigate the trouble in the customer's plant. In this manner the superintendent has an opportunity to observe the kind and extent of the difficulties arising from the defective paper, and the technical man is present to aid in the solution of the difficulty if such a condition is possible. In addition, if the trouble is peculiar in nature, he has a chance to develop suitable tests which will eliminate further trouble from these conditions. The psychological effect on the operating man, due to having the superintendent investigate these complaints, is far greater than to have a technical man pass the information back to the operating department upon his return to the mill.

Testing Requirements

The types of paper made determine the actual details of the tests and control work. In general, these tests are carried out according to standard procedure and the same tests are used from mill to mill. The completeness of the control work depends upon the staff of workers available.

The situation relative to raw materials and their analysis, particularly in the non-fibrous field, has changed in the past fifteen years. Inspection of laboratory reports of a few years ago show that not infrequently shipments of materials varied in quality, such as available chlorine in bleaching powder, adhesive qualities of casein, moisture content of rosin size, etc. However, improvements in manufacturing methods have now brought almost all of the non-fibrous materials to a standard basis of quality. In addition they are carefully checked during manufacture and at the time of shipment to insure uniformity.

In the field of fibrous materials, however, while improvements have been made in their manufacture, occasional shipments are found to be deficient in one property or another. Accordingly they must be used for a different purpose than that for which they were purchased in order to insure the production of uniform grades of paper.

It is obvious, then, that a careful study should be made of those raw materials which cannot be constantly controlled to a definite standard of quality, and particularly those materials which will show a change in the properties of the finished sheet. Careful analysis of pulp shipments should be made with special emphasis on those qualities which the individual mill has found necessary to maintain a uniform product. Casein in the field of coating materials requires a close examination due to the variations in source of supply and to manufacturing methods.

Tests for the evaluation of raw materials should give a true picture of the materials when incorporated in actual production. In other words, test methods should not give results which are misleading. An example of this is in the testing of filler clays for brightness. In the average laboratory, it is common practice to dry the clay, make a smooth pat with a spatula, and to compare the color against a known standard. Others compare the clay in both the dry and wet state in a similar manner. By this method it is found that the brightness of some clays are not as good as those being used. On the other hand, by making up hand sheets, loading them with the fillers in question, and adding, in proportion, the same tinting materials as used in the mill to produce bright white sheets, it is found that often the brightest looking clay does not make the brightest sheet.

The major consideration in working out a control and testing routine for book papers should be the use

requirements of the sheet. The standards of quality established and the methods of testing should be designed to determine beyond doubt whether the paper will do the job for which it is intended. With the wide range of both coated and uncoated papers being made by the book paper industry, it is necessary to analyze each grade in order to determine just what properties are necessary and desirable. Briefly, the more important qualities which should be carefully checked are: flatness of surface, freedom from two-sidedness—both in flatness and color, ink receptivity and ink lay, opaqueness, strength, dirt, hardness of surface, freedom from fuzz, varnishing qualities, bulking qualities, curling tendencies, degree of sizing, amount of filler, density, and degree of hydration. There are additional tests for special papers, and it is obviously not necessary to determine all of the above qualities for each grade of paper. With the full knowledge of the use requirements of the printed piece (knowing the kind of printing to be done, whether a rotogravure, flat bed, Claybourne four color, or offset press is used), the technical division is in a position to specify the type of sheet to be made.

In general, there are six important factors which should be checked in every sheet of book paper whether coated or uncoated.

Flatness of surface is first in importance. This characteristic is being determined at present by various means; i. e., Glarimeter, Bekk Smoothness Tester, inspection of the surface by eye and by feel; and also with the magnifying glass. The use of the Bekk tester, as a control instrument, seems to be questionable at the present time due to the accurate technique required in making the test, and to the time consumed in making a large number of tests. A smoothness tester recently announced by Gurley, operates similar to the Bekk tester, but it is too early to advance any definite statement regarding this instrument.

Ink receptivity and ink lay are second in importance from the use requirement standpoint. This property can be determined by the application under standard conditions of a standard halftone ink to the paper and observing the rate of absorption and lay of the ink. In addition there are several indicator inks on the market which give very satisfactory results.

Opacity in the case of uncoated papers, bonding strength of the raw stock, and coating in considering coated papers are factors next in relative importance. Opacity tests are made with any of the several instruments now on the market; and the series of graded waxes for measuring bonding strength seem to give the most satisfactory method, thus far, for measuring the property. The tendency seems to be toward the use of waxes developed by Dr. H. N. Case. These waxes require a minimum of time for the test and the only special consideration in using them is to maintain a temperature of 70 deg. Fahr. plus or minus 2 deg.

Color and brightness are of next importance. These properties can be checked by the eye in comparison with standards, or by means of electrical instruments now available. Following color and brightness in importance is strength. Strength includes tearing resistance, folding endurance and bursting. These tests are entirely standardized for the present, and the order of their importance depends on the grade of paper being considered.

Due consideration should be given to cleanliness on all grades of paper. If the above conditions, however, for the type of paper being made are correctly fulfilled, criticisms from dirt will seldom be encountered.

In the foregoing list no mention has been made of formation as an important factor. It certainly is, but, if the first three conditions as mentioned above are met in a satisfactory manner, the question of formation will take care of itself. In each case, the factor mentioned is a direct function of formation, and if the sheet is not formed correctly, then these conditions cannot be correctly met.

In addition to the above conditions, and to various other tests which apply on specific papers, there is another general property which is common to all types of paper whether book, bond, board or wrapping grades. This property may be classed as mechanical condition of the finished product and includes such defects as poor sorting, torn sheets, off square trimming, lumps, weight variations, etc. These defects are just as serious as those due to physical defects, and should be watched very closely. It must be remembered that no matter how perfect the paper from the quality standpoint, the printer or converter will be unfavorably impressed unless it can be processed with a minimum of mechanical trouble.

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India's Paper Industry

According to information furnished the Bureau of Foreign and Domestic Commerce by Vice Consul Norris Rediker, Bombay, India, the domestic paper industry in India at present controls eight paper mills with a total of 20 paper-making machines, and an aggregate capacity of about 48,000 tons per annum. These mills, as a whole, use about 70 per cent indigenous fibers, such as sabai grass and bamboo, and about 30 per cent imported wood pulp. Bamboo is slowly displacing sabai grass as a staple paper-making material. Paper manufactured from the latter is too hard to make a satisfactory printing paper but produces a satisfactory low grade writing paper. Bamboo paper generally has a better finish and more nearly resembles imported papers, although bamboo pulp is inferior to pulp from sabai grass in strength and durability. The sulphite and soda processes are employed in the Indian mills. The local industry has had most success in manufacturing printing and cream laid papers, these classes representing about 90 per cent of the total output. A considerable amount of the writing paper produced consists of "badami," a low-grade writing paper manufactured principally from sabai grass. Newsprint cannot be made in India, except from imported wood pulp, the use of which would not prove profitable for the local mills. Neither sabai grass or bamboo have proved suitable for mechanical pulp manufacture. Other papers which it is found necessary to import are: good quality bank and bond papers, rag paper, all-coated paper, special manufactures such as blue match paper and tissue paper, papers of superior quality, and pasteboard and millboard.

Paperboard Requirements of the Converter

By PIERRE DREWSEN, Chemical Engineer
The Hinde and Dauch Paper Company

EVERY papermaker in a board mill should complete his education in the finishing school of a converting plant because the papermaker just hasn't come through if the man whose job it is to unwind the roll and make something useful out of the paper is unable to do so without a continuous and losing battle in the box plant. Indeed, the *sine qua non* of paper making is the ability to make a good roll.

The question naturally arises, "When is a roll good?" It might be answered by stating, "When it unwinds and converts without difficulty," but such an answer would not be very satisfying. Might it not be answered in a negative way by telling about some of the things which make a roll of paper not so good?

Characteristics of the Sheet

At the outset, there are a few things that can be said about the sheet of which a roll is made. A perfect sheet should be "level" across as regards weight. A good way to find out the levelness of a sheet is to take a sample off the reel about two feet wide and all the way across. Divide this sample very accurately with pencil and steel measuring tape into adjacent rectangles about two or three inches wide and any convenient length, say twelve inches. Then cut the rectangles apart very accurately; weigh them on a bone dry basis; and then plot a curve of weights versus distance from the edge. It should be pointed out that adjacent square foot samples are too large for this purpose because the weight deviations tend to average up and cancel one another.

A perfect sheet should be "clear," that is, free from pin holes, slugs, slime spots, or discolorations due to a combination of cloudy formation and moisture. Of course, imperfections such as these do happen even in the best regulated paper mills, and it may be admitted that very often they do not cause great concern to the converting operator except in so far as they offend his aesthetic sensibilities. In the absence of other adverse factors, however, these considerations are not a real source of operating difficulty.

When a sheet breaks in the reel, or in rewinding, it is necessary to make a splice. Where tape moistening machines are used, it sometimes happens that the water compartment runs dry without being noticed, or the tape is moistened too soon before applying. In either case the adhesive doesn't get a chance to stick and an otherwise perfectly good splice breaks because of it.

In corrugating paper it is important that splices present not more than two thicknesses of paper. In other words, joined edges of the sheet must not overlap each other and then both of them be overlapped by the tape; because on some corrugating machines the crescents or "fingers" which keep the paper corrugations in the cells of the corrugated roll while the adhesive is being applied, and until the liner board is pressed on, are adjusted so close to the roll that the third thickness of paper throws them out of adjustment. If the paper slips out of the cells, the corrugations will be crushed as they are being pressed to the liner.

It goes without saying that the tape paper used for splicing should be at least as strong as the paper which it binds as it is essential to maintain some tension on all converting machines to prevent wrinkling and to keep the paper running straight. In this respect, converting machines are like the rewinder on a paper machine.

Paper is sometimes too dry, and if it is too dry, it is usually worse for the converter than if it is too wet. When paper is too wet, the backtenders are practically certain to find it out, but if it is too dry for the convenience of the converter, and still not too dry to rewind well in the paper mill, then the sheet usually looks fairly satisfactory. Such a sheet is apt to be very deceptive and, of course, in the case of a stiff sheet like straw corrugating it is particularly true. The dryer the sheet, the clearer it is, but when it becomes very dry, it won't rewind into a solid roll in the paper mill, and a soft mushy roll will not pass inspection. However, there is a delicate zone of moisture range between "too dry" and "just right" for the backtender. This zone is the cause of difficulty for the converter. When corrugating paper is too dry, it slips out of the cells of the corrugating rolls, in spite of the fingers, and crushes. A too dry sheet, whether chip, straw, or liner board, tends to warp and buckle and sometimes cracks. The converter tries to overcome this defect by steaming the paper or by applying moisture through the use of rolls or in some other way. Therefore, paper a little above the prescribed moisture content rather than a little below is preferred by the converter even though a few moisture spots show, and even though the purchasing department may complain about buying water and paying paper prices for it.

Sometimes the surface of liner board is too rough, a condition brought about, for instance, when the nap wears off the felts, and the fabric pattern is pressed into the sheet to such an extent that the calendar stacks can't work the surface flat. Such a board develops trouble for the printing department. At the same time, if the filler side is rough, no ordinary amount of silicate will suffice to seal the liner to the corrugating.

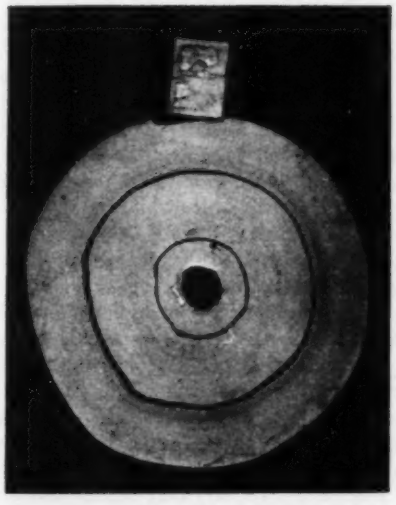
Roll Defects and Requirements

To convert the paper in a roll requires the mounting of the roll on a roll stand. Obviously the radius of the roll must be less than the height of the roll stand above the floor and it ruins a converter's disposition when an oversize roll has to be cut down with a baling hook.

The core of the roll has to be open in order to take the shaft for mounting it on the roll stand. Yet very often wood plugs inserted at the mill are not hammered in tightly enough and fall out in transit. When such a

roll is dropped on its side near the roll stand, the core collapses and the shaft has to be hammered in. Core collapses may become serious if paper is shipped any distance or if it is subjected to unusual handling during transit. A paper or metal core is sometimes used to prevent this trouble.

A soft roll is almost certain to collapse. It is made when insufficient tension is applied during rewinding, when the sheet is not perfectly level in the "cross" direction, and when the paper is too dry. The paper on such a roll, after the roll has been secured to the shaft, may slip sideways on the shaft, first one way and then another, as soon as the corrugator is put into operation. Of course, this may happen even without core collapse. An experienced operator, however, can usually spot such a roll beforehand, and take preventive measures against side slipping. Nevertheless, it takes time to adjust clamps, and time costs money when the pay roll goes on and the machine waits.



Folds in end of roll caused by one edge of sheet being longer than that of the other

The climax of the converter's difficulty is reached when a roll with a "shrunken edge" is encountered. In the laboratory paper is thought of in terms of neatly cut square foot samples to be measured on polished instruments for weight, caliper, Mullen, and the like. It should be realized more fully that a roll of paper is just as different from a sample taken from it as a crowd is from one of the individuals who compose it. The product of a paper mill should be thought of, not as a sample out of a salesman's portfolio, but as a ribbon a few feet wide and one or two miles long. If this ribbon were perfect and were unrolled on a level straight road, the edges of the sheet would parallel the sides of the highway. On the other hand, if a roll of paper which has a shrunken edge is stretched out, it would lie neither level nor in a straight line.

On a converting machine such a roll develops wrinkles or folds, sometimes large and sometimes small, which are not only unsightly, but which spoil the product. They develop into cuts, not unlike calendar cuts, when the paper goes between rollers, or when it is combined with single face. The only remedy for a condition of this kind is to increase the tension on the paper in an attempt to stretch it to a point where the wrinkles disappear. This procedure runs up the power bill and unusual stretching does not do the product any good. Of course, if the edge is shrunken too badly, practically nothing can be done other than to take the roll off and use it for another purpose. Sometimes the paper may be converted by running the machine very slowly at maximum tension, but here again the time element introduced eats up the all too narrow margin of profit.

Amusing stories are told about the lining up of rolls and dryers in making a paper machine installation and the subsequent amazement of the engineer who finds, when the sheet is taken over, that the paper runs off to one side; and then how the machine tenders loosen the floor bolts and knock the rolls and dryers slightly out of square to make the paper run straight. Whether or not this occasional peculiarity of a paper machine has anything to do with shrunken edges, is doubtful. It is known, however, that a heavy streak down one edge or near the edge of the sheet contains more moisture than neighboring areas; and if such a sheet happens to be rewound a trifle too loosely, the slightly damp streak will shrink as it dries out in storage.

The shrunken edge is a cold sad fact which the converter has to face. Its prevention apparently lies in having a level sheet of proper caliper and proper uniform moisture content, and especially in making good, sound, hard, tightly wound rolls, with cores that will not collapse. Too much emphasis cannot be placed on the need for the production of *good rolls* as good rolls contain something more than just good paper.

The roll shown in the accompanying illustration isn't a roll of liner board or straw, but it gave no end of trouble in converting. The dark lines are merely crayon marks made to show "folds" caused by one edge of the sheet being longer than the other. Sending an original print of this photograph together with a letter to the mill furnishing the paper made it possible for the mill to correct the difficulty before making a succeeding shipment. In other words, when the mill knew what was causing the trouble, it went to work to stop it. Therefore, may it be reiterated that every papermaker should complete his education in the finishing school of a converting plant.

The writer wishes to acknowledge, with grateful appreciation, the assistance received from Conrad Brengartner, box plant superintendent, Hinde & Dauch Paper Co., Sandusky, Ohio, who offered a number of constructive suggestions before and after reading the manuscript.

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The Colloidal Nature and Related Properties of Clays

In the August number of the *Journal of Research* (RP706) a theory is presented on the colloidal nature and related properties of clays, based upon the findings of certain soil scientists and the existing knowledge of the phenomena of coagulation, deflocculation, plasticity, drying, shrinkage, and dry transverse strength. It is thought that this paper will allay some of the present confusion of ideas concerning the subject of clay colloids by adaptation of this theory to furnish a more satisfactory explanation of the above phenomena.

Lignin in Douglas Fir

By A. J. BAILEY, M.S.F.
College of Forestry, University of Washington

NO attempt is made at present to utilize Douglas Fir in the sulphite process due to the difficulty in digestion and the poor quality of the pulp produced. It would seem advantageous to combine these two if possible: the most important chemical pulp process and one of the most important tree species of the world. Since the chief function of chemical digestion is to remove lignin, it is logical to suppose that lignin is the cause of the trouble and that an investigation into the quantity and character of lignin in Douglas Fir and its behavior in the sulphite process might offer a solution.

Chemical Basis

A survey of the chemistry of lignin will be omitted as it is adequately treated elsewhere *(7, 8, 10, 18, 80, 81)*. In spite of the vast amount of research on lignin since its discovery almost a century ago *(75, 76, 77, 78)*, its structure is by no means settled today. On the basis of experimental evidence, Klason has enunciated an hypothesis which seems to furnish the best understanding of the lignin entity *(57)*. His works and theory, which are abundantly verified by independent workers, appear to offer the closest approximation to fact that is available, and as such, form the basis for this investigation.

Briefly, Klason's theory *(24* to *71* inc.) is that lignin occurs in wood as a single chemical compound *(33)* consisting of nine molecules of coniferyl aldehyde with one molecule of water in each double bond *(63)*, joined by the ether linkage from the phenol group of one coniferyl aldehyde unit to the aldehyde group of the next unit, the last two of which have methoxyl replaced by acetyl *(63)*. Upon treatment with sulphurous acid, the aliphatic portion of the coniferyl nucleus loses one molecule of "aldol" water with the formation of an unsaturated linkage. Sulphonation follows at this bond. The lignin molecule then splits into three molecules of a trimeric form of coniferyl aldehyde hydrosulphonic acid *(63, 67, 71)*, or more commonly, ligno-sulphonic acid. Two molecules of this acid can be precipitated quantitatively with beta napthylamine hydrochloride *(58, 63, 67)* to form a napthylammonium salt which, through tautomeric isomerism, forms an "inner salt" *(63, 67)*; the third molecule of the ligno-sulphonic acid may be precipitated with lead acetate, and the free acid regenerated with hydrogen sulphide *(44, 63, 67)*. Klason calls the former alpha *(43, 63, 70)* and the latter beta ligno-sulphonic acid *(36, 44, 63, 70)*.

Experimental evidence in support of this hypothesis is voluminous and varied. Analyses of the inner salt of the alpha acid indicate a composition corresponding to a trimeric form of coniferyl aldehyde *(63, 67)*; the latter and its hydro-sulphonic acid react in a manner similar to that of vanillin *(63, 67, 87)* as would be expected, which in certain reactions parallels that of lignin in wood *(24, 26, 27, 94, 95, 96)*. Hydroxyl groups are identified by methylation with methyl sulphate *(93)*, methoxyl by distillation with hydroiodic acid *(11, 97)*, acetyl by hydrolysis of the soluble "reserve" lignin *(63, 67)*, and the aldehyde by condensation with Schiff's bases *(2, 32, 63, 67)*. The synthesis of glucosides *(5, 86, 90)*, particularly coniferin *(23, 72, 92)* and its derivatives *(3, 82, 83, 84, 85, 88, 89, 91)* affords an interesting comparison and check on the natural compound. Both the synthetic coniferin and that occurring in the cambial sap *(49)* may be hydrolyzed or fractioned with emulsin *(49, 82)* to coniferyl alcohol. Cautious oxidation of the latter yields the corresponding acid; stronger oxidation yields vanillin *(67)* just as cinnamic alcohol and acid yield benzoic acid. Coniferyl alcohol is apparently auto-oxidizable to coniferyl aldehyde *(67)* which gives intensive lignin reactions and yields the previously mentioned salts when treated with sulphurous acid and beta napthylamine hydrochloride, just as cinnamic aldehyde gives a corresponding compound under similar treatment. Czapek *(3)* found that hadromal, synonymous with ferula aldehyde and coniferyl aldehyde, is apparently produced by the action of stannous chloride upon wood. This has been verified by Hoffmeister *(22)*, and it seems to have reactions identical with those ascribed by Klason to the coniferyl aldehyde prepared by other means. These compounds and the soluble reserve lignin *(67)* of the wood extracted by methyl alcohol give lignin reactions; the purified solute of the latter solution agrees with the formula of the total lignin in the wood, even to acetyl *(67)*. Distillation products *(6, 10, 79, 80)* and decomposition products *(6, 9, 10, 80)* of wood and lignin prepared by various methods indicate an aromatic nucleus *(7)* as the structural unit of the lignin molecule, although the former is debatable since the discovery of the formation of lignin-like compounds from cellulose under relatively mild conditions *(16, 17)*.

Further evidence supporting Klason's theory is offered by the synthesis of coniferyl aldehyde from vanillin and acetaldehyde *(56)* and by other means *(74)*, which compound has properties identical—with exceptions noted below—with those of the product prepared from wood. While Pauly and Feuerstein failed to verify this fact *(73)*, Klason claims that this difference is due to the cis and trans relation in the double bond *(56, 67)*. Hillmer and Hellriegel found that Pauly's and Feuerstein's objection was valid, but showed by ultra-violet absorption spectra that lignin is a coniferyl alcohol derivative *(21)*, in agreement with Czapek *(3)*. Herzog and Hillmer showed the similarity of the ultra-violet absorption spectra of coniferin, isoeugenol, sulphite liquor, technical ligno-sulphonic acid, and Klason's alpha ligno-sulphonic acid *(19)*. They later showed this same similarity in the coniferyl nucleus and lignin and agreed with Klason as to the acrolein nature of lignin *(20)*. In view of this evidence, this investigation assumes that Klason's theory offers the best available understanding of the lignin molecule.

Procedure

Since sulphurous acid reacts with lignin, it follows that waste liquor from the sulphite process is available for research. After experiments with different methods the following procedure gave consistent results. Data on this phase of lignin chemistry is presented in the literature with a view toward establishing the identity of lignin rather than on an analytical basis. Unfortunately, some important details were mentioned only vaguely or omitted completely. This procedure is the result of considerable analytical work on almost a hundred digestions, and as far as the writer has been able to learn, is the first complete analytical description of the determination.

Six to seven grams of wood in the form of splinters having one dimension of one millimeter or less are dried at 105 degrees (all temperatures refer to the Centigrade scale) and weighed into Lintner bottles of 200 milliliters capacity. The bottle is filled with cooking liquor made by saturating water (condensed on glass) with SO_2 at room temperature and adding $NaHSO_3$ so that the combined SO_2 is 1.0 per cent of the solution. Digestion occurs at 95 degrees. After the liquor becomes colored, it is decanted and the bottle refilled; this process is repeated until continued digestion does not color the liquor. The pulp is filtered, washed, dried at 105 degrees, weighed, and tested for lignin with beta naphthylamine hydrochloride. The filtrate is diluted to 500 milliliters and 100 milliliters removed to a beaker for analysis. After boiling to drive off the free SO_2 and the SO_3H bound loosely to the aldehyde group, the solution is made at least 0.2 normal with hydrochloric acid. While still just below the boiling point, a warm solution of beta naphthylamine hydrochloride is introduced until no further turbidity occurs upon continued addition. It is then allowed to digest on the hot plate at about 60 degrees until the inner salt has completely precipitated. It is then filtered on a tarred Gooch crucible, dried at room temperature, 100 degrees, and 130 degrees progressively *(32, 39)* and weighed. The filtrate is cooled to 10 degrees to 15 degrees and precipitated with a saturated solution of lead acetate. The resulting lead salt is filtered, washed, cooled to 10 degrees to 15 degrees, and treated with H_2S. After filtering off the lead sulphide, the beta acid is evaporated to dryness at about 50 degrees and weighed.

Results

Two woods, Sitka spruce *(Picea sitchensis)* and western hemlock *(Tsuga heterophylla)*, which are commonly used in the sulphite process, were analyzed for control and comparison with the Douglas Fir *(Pseudotsuga taxifolia)*; the spruce offered the added advantage of an approximate check in duplicating Klason's work, most of which dealt with wood of this genus. Comparative values and the following results, based on the dry weight of the wood, obtained using the procedure outlined above, are shown in Table I.

Analyses of duplicate digestions checked within 0.1 per cent absolute error. The percentages of alpha and beta lignin were calculated on the basis of Klason's formulas as follows:

alpha lignin *(67)* — $(C_{10}H_{12}O_4)_6$
inner salt of alpha ligno-sulphonic acid *(67)* — $(C_{10}H_{10}O_3)_3 . H_2SO_3 . C_{10}H_9N—H_2O$
beta lignin *(67)* — $C_{10}H_{12}O_4 . (C_9H_9O_4 . COCH_3)_2$
beta ligno-sulphonic acid *(70)* — $(C_9H_{10}O_4)_2 . C_{10}H_{10}O_3 . H_2SO_3$

It will be noted that contrary to Klason's opinion *(67)*, there are significant variations in the yields of pulp and total lignin. These variations, in the writer's opinion, are entirely reasonable since no adequate evidence has been advanced to show why variations should not occur. On the contrary, present ideas of lignified compression wood seem to indicate that variations in the lignin content are a natural and common occurrence. It seems to be true that lignin is linked to cellulose as Klason suggests *(63)*, since many lignin reactions require, or at least are accelerated by an acid to free the glucosidally bound aldehyde group. Using his own theory, however, it is equally possible that this aldehyde group, instead of being linked to the hydroxyl of cellulose, may be joined in a similar manner to the phenol or possibly to the aliphatic hydroxyl of another lignin molecule, thus obviating the necessity of any constant relation between lignin and cellulose.

TABLE I

	pulp	alpha lignin	beta lignin	total lignin	Per Cent of total lignin	
					alpha	beta
Theory					64.6	35.4
Klason	52.0	20.0	11.8	31.8	63.0	37.0
Spruce	52.5	19.9	10.1	30.0	66.3	33.7
Hemlock	48.1	24.7	8.0	32.7	75.5	24.5
Doug. Fir	46.8	24.8	7.9	32.7	75.8	24.2

The most significant result of this investigation lies in the difference in the quantities of alpha and beta lignin which indicates strongly that the lignin molecule in Douglas Fir and hemlock differs from that in other woods. The percentages found agree closely with a composition of seven coniferyl aldehyde units in the alpha lignin and nine units in the whole lignin. The resulting molecular rearrangement required to give the compounds actually isolated, however, is not probable; hence, the relation is probably an accidental one. With slightly less close agreement a formula of nine coniferyl aldehyde units in the alpha lignin and three units in the beta lignin satisfies all requirements. The proposed formulas follow:

alpha lignin — $(C_{10}H_{12}O_4)_9$
beta lignin — $(C_{10}H_{12}O_4) . (C_9H_9O_4 . COCH_3)_2$
total lignin — $(C_{10}H_{12}O_4)_{10} . (C_9H_9O_4 . COCH_3)_2$

The mechanism of the resulting reactions is then exactly the same as those Klason proposes. Using his theory the only modification required is that Douglas Fir and hemlock lignin contains one more trimeric coniferyl aldehyde unit than is the case with other woods. In view of the general tendency in the plant kingdom to form long molecular chains composed of small similar units, this view is entirely tenable. It must be

remembered, however, that this hypothesis is suggested on the basis of the foregoing evidence only as a probable explanation; further research is necessary to establish it as fact.

As will be noted, the analysis of spruce is in reasonable agreement with theory. The exact relation between the low cellulose content and the different ratio of alpha to beta lignin in Douglas Fir and hemlock is not yet clear.

The pulp obtained from spruce and hemlock was almost as white as filter paper; that from Douglas Fir was slightly less white, the color being that of the original wood in greatly reduced intensity. Further study will be necessary to determine the cause of this residual color; it is easily bleached by alkaline hypochlorites.

Considerable variations in the color of the waste liquor of equal concentrations from different woods were apparent. The final concentration of the liquor before analysis, mentioned above, provided a basis for exact comparison. That from spruce was light amber, and that from Douglas Fir and hemlock was light brown. Upon removal of the alpha acid from the solution, all were light yellow, indicating that most of the color of the waste liquor is due to it. By concentrating the spruce liquor before removal of the alpha acid, a solution similar in color to that of the Douglas Fir and hemlock was obtained. Apparently, colorimetric tests of the liquor to determine the completion of commercial cooks containing unknown amounts of Douglas Fir or hemlock will always be unreliable. This difference in color is a qualitative proof of the difference in lignin.

The appearance and gross characteristics—such as the melting and darkening of the inner salt if heated while moist *(32)*—of the inner salt and the solid beta acid and its solution from different woods were identical to the unaided eye and under the microscope.

Experimental Details

Preliminary work included an extractor which delivered both liquid and solid phases of the cooking acid to wood flour on a filter; unfortunately, the results were not satisfactory. Carius tubes were substituted and heated in a gas oven with thermostatic control *(1)*. The tubes were incased in an iron jacket, and one end of the entire bomb assembly was reciprocated vertically, providing circulation throughout the period of digestion. Even with abnormally high calcium concentrations, however, "black cooks" resulted at temperatures of 140 degrees to 175 degrees. According to Klason *(67, 70)*, a "black cook" is due to polymerization of the beta ligno-sulphonic acid, caused by failure to neutralize the hydroxyl in ortho position after hydrolysis of the acetyl *(71)*. One would suppose that if the combined SO_2 were increased to 100 per cent of the total SO_2; i.e. no free SO_2, that a black cook could not result. This, however, is not true since wood digested in water and $NaHSO_3$ was blackened at temperatures between 130 degrees and 175 degrees. This condition did not obtain, regardless of the period of digestion—as Klason indicates *(67)*—at or below 100 degrees even when the combined SO_2 was reduced to 20 per cent of the total SO_2, which is the lowest usually used in commercial digestion. All acids used, with combined SO_2 varying from 20 to 100 per cent of the total SO_2, blackened the wood by digestion above 130 degrees. Higher temperatures merely accelerated this action; alkali slowed it down, but in no case prevented it above 130 degrees; the velocity of the reaction causing the darkening seems to be more nearly proportional to the total than to the free SO_2. The minimum temperature at which this reaction is significant seems to be between 100 degrees and 130 degrees; further study is necessary to understand this reaction completely.

In order to remove the lignin quantitatively without polymerization, only the lower temperature range was available. This permitted the use of Lintner bottles which allowed convenient decantation and renewal of liquor. The use of wood splinters made possible decantation without loss of wood from the bottle. Calcium was first used as the alkaline constituent of the cooking liquor, but due to the formation of an insoluble white crystalline solid during the later stages of digestion, sodium was substituted to remove error from the pulp determination. This insoluble compound may be calcium sulphate or polythionate; further work is necessary to establish its identity. It is of theoretical and practical interest since it occurs only after extended digestion and probably bears directly on the mechanism of the cooking process.

Difficulty was experienced in obtaining and treating the various precipitates. The normal salt of alpha ligno-sulphonic acid precipitates easily provided that the liquor is not too dilute, that a large excess of precipitant is added, and that the SO_3H bound loosely to the aldehyde has been driven off by boiling or by hydrochloric acid, or both. The tautomeric change to the inner salt, however, proceeds with more difficulty. Two conditions are particularly desirable, if not essential: a high concentration of the hydrogen ion, and an elevated temperature. The normal salt is quite soluble under these conditions so that more than a ten-fold excess of the precipitant may have to be added to cause completion of the reaction. When it is added just below the boiling point, the light color of the normal salt changes in a few minutes to the yellowish-orange of the tautomeric isomer.

Precipitation of the beta acid at room temperature results in the production of a very fine precipitate which is exceedingly difficult to filter. A lower temperature (10 degrees to 15 degrees) produces a precipitate which is easily handled. Treatment of the latter with H_2S at room temperature results in the formation of colloidal lead sulphide; digestion increases the degree of subdivision. On the other hand, precipitation at 10 degrees to 15 degrees permits easy filtration. Oddly enough, no difficulty was caused by the resin; it was apparent only as an insignificant irridescent film on the surface of the liquor.

Conclusion

Lignin in Douglas Fir and hemlock, according to present findings, seems to have a molecule of twelve rather than nine coniferyl aldehyde units as seems to be the case with other woods. This contradiction to Klason's theory is reconciled by simply adding one trimeric coniferyl aldehyde unit to his proposed formula for lignin. Chemically, this is entirely tenable.

Considering spruce as a basis, hemlock is considerably more difficult to delignify completely; Douglas Fir is approximately equal to hemlock. This points to the difference in the lignin of these woods. While Douglas Fir pulp is not as light in color as spruce and hemlock pulp, this is not caused by lignin, as we know it now. Chemically there is no reason why Douglas Fir can not become a source of sulphite pulp. Difficulty from resin or similar cause can probably be worked out in the mill under actual conditions rather better than in the laboratory. External counterflow circulation of the liquor in a diffusion battery system with indirect heating would lend itself admirably to removal of resin and to complete and economical digestion of Douglas Fir.

Summary

The several contributions of this investigation follow:

1. A review of Klason's theory of lignin with comprehensive citation of supporting evidence.
2. The translation of Klason's theory to an analytical procedure.
3. The presentation of experimental evidence which indicates strongly that the lignin molecule in Douglas Fir and hemlock consists of four rather than three trimeric coniferyl aldehyde units as is the case with woods heretofore studied.
4. Data on the chemistry of the sulphite process.
5. Evidence that Douglas Fir can be successfully used for sulphite pulp.

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New Casein Process . . . Continuous in Character

Development of a new machine manufacturing casein from skimmed milk in one continuous process is described in a recent report to the A. C. S. In the new process, developed by F. L. Chappell of Hobart, N. Y., the milk is run through rapidly in ribbon-like streams, each step being accomplished by an unerring machine. Acid is mixed instantaneously and uniformly with the milk in a small stoneware cylinder containing baffles. Precipitation of "foreign" proteins is prevented by controlling the degree of acidity at all times. In other units of the machine the curd is separated from the whey, all soluble impurities washed out, and the casein continuously pressed to prevent formation of large masses. Prompt drying removes moisture and acid from the particles of casein, which are ground to the necessary fineness. Hydrochloric acid is used, since it precipitates casein low in ash content. *(Chemical Industries.)*

Pacific T. A. P. P. I. Is Host to Parent Association

THE Pacific Section of the Technical Association of the Pulp and Paper Industry was host to the parent society at the International Convention held at the Multnomah Hotel, Portland, Oregon. The program opened on the morning of September 10 and closed with a farwell banquet on the 13th.

The program committee had arranged several field trips which synchronized with the technical sessions to give a well rounded picture of the progress being made in the industry. The papers read were concerned with many of the more important phases of pulp and paper making and were received with much enthusiasm by the large audiences.

Lawrence Killam, chairman of the Pacific Section opened the meeting and welcomed the many visitors, whereupon Clark C. Heritage, President of TAPPI, was invited to preside over the first session of the convention. Mr. Heritage, upon taking the chair, voiced the appreciation of the Society for the opportunity of holding this meeting with the Pacific Section. He pointed to the breadth of view and the nationalism to be gained by the interchange of ideas among the members who had come from Maine, Louisiana, Massachusetts, Mid-Western States, the Pacific Coast, and Canada.

The first paper, entitled *Early Pacific Coast Pulp and Paper Mills*, by Ralph M. Snell and B. T. McBain was read by title only.

Dr. H. K. Benson, Professor of Chemical Engineering at the University of Washington, presented a paper on *The Pulping of Douglas Fir by Ammonia Base Acid* which described a number of experiments and the results when various woods are cooked with ammonia base liquor. The cooks were made with a mixture of commercial spruce and hemlock chips, with old Douglas fir, young Douglas fir, and with Douglas fir which had been previously extracted with a weak ammoniacal solution at 70 deg. C. A small rotary digester of KA4 metal was used for the cooking process and a standard time-temperature heating rate was maintained. In evaluating the pulps it was found that young Douglas fir closely parallels the commercial spruce and hemlock; that pretreated Douglas fir approaches spruce and hemlock and that pulps made from old Douglas fir are of a distinctly lower order of quality.

Dr. Benson had a number of pulp samples on display which clearly showed the variations in quality available from the woods used. The extraction of resins with ammonia and the recovery of chemical and of rosin was also shown to be feasible.

In the discussion of this paper, Ray Hatch of the Weyerhaeuser Timber Company, indicated that sulphite pulp manufacturers having perpetual stands of hemlock mixed with fir would prefer to make pulp from hemlock and saw logs from the fir.

Dr. C. E. Curran, in charge, Section of Pulp and Paper, Forest Products Laboratory, reviewed some of the work done at Madison and voiced the opinion that where stream polution is an important factor, sodium and ammonium base sulphite solutions may be justified.

The Pulpwood Forests of Oregon and Washington was the title of a paper then read by Thornton T. Munger, Director, Pacific Northwest Forest Experimental Station. Mr. Munger developed this interesting subject by discussing a few pulpwood forests of the region and by giving some pertinent figures as to rates of growth. He pointed out that the Douglas fir, which comprises 40 per cent of the saw timber of Western Washington and 75 per cent of that of Western Oregon is sometimes found in pure stands which cut over 100,000 board feet to the acre. Trees are found over 300 feet high and 10 feet in diameter. In the two states some 331 billion board feet are now standing.

Speaking of hemlock, the author informed his audience that this wood makes up nearly 80 per cent of the pulpwood used in Oregon and Washington. The former state has 25 billion board feet while the latter has 80 billion. Considering all types of pulpwoods, excluding Douglas fir, it was brought out that a total of 170 billion feet are standing, or 250 times the annual requirements of the present paper mills in the region.

The next paper on the program was given by Dr. Walter F. Holzer, chemist, Crown Willamette Paper Company, Camas, Washington, under the title of *A Study of the Coloring Matter in Pine Kraft Pulps*. In the presentation of this interesting paper, Dr. Holzer discussed some of the characteristics and properties of the colored components found in pine kraft pulps. He showed that coloring matter had been extracted from black liquor and pulp, that by means of color absorption curves and color with pH, these colored compounds may be considered to be the same single type compound.

The chemistry of the phlobotannins was briefly mentioned and compared with that of the color compounds found in the pine kraft. In addition, organic sulphur was found in the coloring matter, the amount varying directly with the sulphur content of the cooking liquor. Experiments indicated that bleachability of such pulps varies inversely with sulphur content, the more easily bleachable ones containing the least organic sulphur. Dr. Holzer carried his research beyond this point in the hopes that a method for the easy removal of coloring matter could be revealed. In so doing, an oxidation-reduction study indicated the matter to be acidic in nature.

Dr. Curran, in the discussion which followed, was greatly impressed by the paper and spoke of it as being of much importance to the kraft producers. Dr. Curran mentioned some work in progress which shows that weakly alkaline kraft cooks produce pulps that compare favorably with unbleached sulphite pulps. Apparently, the sulphur dye complex is soluble in dilute alkali and can be removed because such pulp does not return to its normal kraft color.

Dr. C. E. Curran then read a paper, *The Bleachability of Western Hemlock Groundwood Pulp*, in which he reported studies describing the removal of phlobophenes in hemlock heartwood by means of alkaline peroxide solutions. The process worked very well when applied to small or thin sections of wood. The author indicated that the real problem is the removal of such coloring before it diffuses throughout the wood.

The subject of *Heat Transmission* was ably presented with the aid of slides by Charles S. Keevil, Professor of Chemical Engineering at Oregon State College. Professor Keevil reviewed the general principles of heat transmission and dwelt to some extent upon the film concept. The mechanisms by which gases from the sulphur burner are cooled, the digester liquor is heated, and paper is dried were explained by means of the film concept. The importance of the Reynold's criterium and of the Prandtl number was discussed and the extension of operating data under plant conditions was shown to be of scientific and practical value.

The last paper of the morning session was read by J. Glenn Long, Crown Willamette Paper Company in the absence of M. W. Phelps, Pacific Mills, Limited, who had prepared a paper under the title *Technical Control in Pulp and Paper Manufacture*. The paper stated that the technical control department should have jurisdiction over, or at least be integral with, five major divisions of manufacturing enterprises. The divisions listed were: testing of raw materials, process control of mill operations, testing of finished product, service and sales development, and research. Under each of the above divisions, Mr. Phelps had ably prepared a list of duties which, when correlated within the control department, presented a strong working unit.

The afternoon session was opened with

Myron H. Black, Technical Director, Inland Empire Pulp and Paper Company, in the chair. The meeting immediately proceeded with the program, with a paper of *The Casting Problem of Stainless Steel* presented by Mr. Ernest G. Swigert, Vice-President, Electric Steel Foundry Company, Portland, Oregon.

Mr. Swigert discussed the basic differences between rolled and cast steels, bring out that rolling has two advantages over casting in that, due to repeated rolling, a uniform stock of small crystal formation can be made. Rolled metal shows greater strength, ductility, shock resistance, and is free from shrinkage, strain, and defects such as blow holes.

The advantages of casting structures over those of rolling were exemplified by design problems where metal can be poured to desired thicknesses with subsequent savings. Heat treated castings, it was pointed out, show the best corrosion resistance. The introduction of alloying metals such as molybdenum give rise to grave problems in the rolling operation but effect the casting process little. Mr. Swigert emphasized the importance of perfect surface in a stainless steel casting and how difficult it is to obtain. A minor defect, which would be unnoticed in an ordinary casting, is fatal in stainless steel. The sand mold into which the steel is poured offers every chance of such defect. The types of sand, the moisture content, the porosity and the method of molding contribute hazards which only experience and research can control. A number of fine slides were used.

Norman Kelly, Weyerhaeuser Timber Company, in discussing the paper said that his experience led him to believe that welded shapes of rolled metal were as satisfactory as cast forms. In reply, Mr. Swigert described the ease and consequent cheapness of making small quantities of special alloys as compared with the large amounts necessary when rolled material is desired.

C. C. Hockley, State Engineer for Oregon, P. W. A., then presented a paper titled, *Power Possibilities in the Northwest*. Mr. Hockley described the various power projects being developed in Washington and in Portland. Beginning at tidewater with the Bonneville dam, 3,685,000 firm horse power can be developed along the Columbia River which may deliver power to Seattle and Portland at 2.0 to 2.4 mills per kilowatt-hour. The Grand Coulee Dam will develop 775,000 firm hp. It was interesting to note that the West Coast has one-third of the potential water power of the entire United States, distributed as follows: Washington, 7,145,000 hp.; Oregon, 3,700,000 hp.; and California, 4,600,000 hp.

In the discussion which followed, Mr. Hockley claimed that power rates at present were very much the same throughout the entire United States.

Professor W. L. Beuschlein, of the Chemical Engineering Department of the University of Washington, then read a paper on *Theory of Absorption Applied to the Sulphite Tower*. This technical paper was described by means of curves and operating data calculated from a systematic investigation of the system CaO-SO_2-H_2O. Methods for the prediction of capacities of sulphite towers operating under various conditions were explained. Diagrams were discussed which described equilibria for all conditions of concentration, temperature, and pressure. A typical problem was worked in order to show the method of application of the data to mill practice.

An interesting dissertation covering *Design and Operation of Hog Fuel Burning and Handling Equipment* was given by H. S. Bastian, Combustion Engineering Company. After describing many methods used for the transportation and handling of hog fuel, the trends of furnace design were followed. Mr. Bastian said that more efficient operation and not greater capacity was very desirable at present. The Birgmann inclined grate makes use of the combined effects of drying, distillation of volatile matter and combustion. Efficiencies of 70-75

The President's Dinner held on Monday evening was one of the social events of the convention

per cent are regularly obtained when using preheated air and fuel of 40 per cent moisture. Hogged fuel has been demonstrated to be capable of being used for the generation of steam at the new high pressures found in industry.

The last paper of the day under the heading *The 1¼-Inch Steam Line Between the Washington Gas and Electric and the Longview Fibre Companies* was read by Ralph Smalley, vice-president, Washington Gas and Electric Company. This transmission system of more than one mile in length carries superheated steam at over 200 pounds pressure. The engineering problems encountered, while not new, presented many difficulties. The complete cost was found to be approximately $10 per running foot.

An all day field trip to the Weyerhaeuser woods on Tuesday, September 11, created a most glowing picture of the West. The entire party, as the guest of the Weyerhaeuser Timber Company, boarded the company's "Paul Bunyan" express train to be taken from Longview into the woods near Mt. St. Helens. For much of the 28 miles, great forests of hemlock, spruce and Douglas fir were viewed. The logging operation units of the company were inspected where daily two trains of 55 cars each are pulled out for the lumber and pulp mills at Longview. Approximately 1,000,000 feet are cut per day.

Ed Baker, the Bull of the Woods, manager of Logging Operations, informed the guests in no uncertain logging terms of everything the eye, ear and mind might contact. A special show of spar topping at 170 feet, tree felling and bucking was put on for the visitors.

A Lidgerwood tower skidder yarding logs for a radius of 1,800 feet attracted much attention. This machine carries a steel tower 105 feet high which supports a two-inch steel skyline cable. A carriage runs along this skyline to a spar tree near the felling operations. After the trees are felled and bucked into 50-foot lengths, the choker lines running through the skyline carriage are attached to logs and in a few minutes, the monarchs of the forest have been pulled high into the air, carried to the skidder and deposited upon cars. The entire crew of 22 men deliver logs on board cars at the rate of 13 minutes per car.

The Weyerhaeuser Timber Company plans upon a perpetual supply of raw material from its holdings. Second growths are carefully inspected, and fire lanes are maintained. Approximately 70 years will be required for new stands to develop sufficiently for second cutting.

The Wednesday morning meeting was opened with R. S. Hatch presiding. The first paper was presented by Frederick Wierk of Johnson and Wierk, Inc., on the subject of *Consistency Regulations*. After defining terms to be used, Mr. Wierk showed that all consistency regulations depend upon relative viscosity measurements which are made by either mechanical or hydraulic methods. Regardless of which scheme is used for the viscosity determinations, the possibility of hunting in the mechanical control device is reduced by having the sampling point following the dilution point as closely as is physically possible.

The author pointed out to Walter Swanson of Kimberly-Clark Corporation that hunting was the greatest deviation among consistency regulators. Ray Hatch briefly described a method available at the Weyerhaeuser mill wherein consistency is measured between the limits of 0 to 1 per cent by means of the absorption of light working in conjunction with a photo-electric cell.

Results of mill experience by Dr. Otto Kress, W. H. Swanson, E. C. Porter, and B. F. Smith were presented by Mr. Swanson in a paper entitled *The Texas Gulf Sulphur Company's Spray Type Sulphur Burner*. This valuable information was made available through co-operative research in which the Paper Institute, Appleton, Wisconsin, Kimberly-Clark Corporation and the Texas Gulf Sulphur Company participated. Sulphur is melted in pots of 50,000 pounds capacity wherein insoluable impurities are removed, then pumped into a water-air cooled burner head from which it is burned under controlled combustion. The average gas analysis for the past year's operation shows 19.5 per cent sulphur dioxide. For short periods of a week or more, 20.3 per cent SO_2 gas was made. Due to the completeness of combustion, oxidation of sulphur to the trioxide is largely eliminated. Other outstanding advantages of spray burning are: simplicity of operations, ease of starting up and closing down burner, flexible capacity, of from 6 to 20 tons per 24 hours and waste heat recovery.

The discussion which followed Mr. Swanson's presentation was confined to the troubles encountered with the fusion of certain furnace linings. The author stated that for the temperature of 2700 deg. Fahr., fused ceramic ware consisting of 60 per cent Al_2O_3 was very satisfactory.

Dr. H. C. Schwalbe, Dill and Collins, Inc., then presented the committee report on Pulp Specifications wherein the advantages in economy of having specifications were emphasized.

The next paper *Sprayed Molten Metal Coatings* was presented by E. V. David, Air Reduction Sales Company. Methods of spraying molten metal for enlarging metal parts, protecting against corrosion and decorative purposes were ably demonstrated by means of slides.

The afternoon was given over to a plant inspection of the properties of the Crown-Willamette Paper Company at Camas, Wash. The courtesy of the host was well exemplified by the efficient distribution of the large party into groups of six to eight and the intimacy with which all were shown about.

The last meeting of the convention opened with a discussion of *Economic and Safety Features of Cubicle Type Motor-Control Units* which was presented by K. L. Howe, Westinghouse Electric Company. By means of slides, the advances in motor safeguards were indicated and then the details of the modern cubicle unit were explained.

Another phase of the electrical division of modern pulp and paper mills was discussed by R. V. Maier, General Electric Company, who read a paper entitled *Modern Electrical Equipment in the Pulp and Paper Industry*. It was shown that the machine tender has complete control of the speed of his machine by turning a rheostat handle, and may shut down the whole unit by pushing a button. The vital parts played by vacuum tubes and photoelectric cells was explained.

The effect of pH upon the Adsorption of Dyes by Cellulose and Fillers was the title of a paper prepared by Dr. Leo Friedman, Professor of Chemistry, and D. V. Kuykendall, Jr., of Oregon State College. Mr. Kuykendall reported on studies made of the adsorption of acid and basic dyes upon alumina, cellulose, and paper fillers. These studies demonstrated the important part played by freshly precipitated alumina and the necessity for careful control of the pH. The adsorption of methylene blue upon cellulose, kaolin and talc was proven to be true adsorption.

The last paper of the meeting was read by F. A. Steele, The New Jersey Zinc Company, on the subject of *Increasing the Usefulness of Less Expensive Paper Fibers with Zinc Sulphide Pigments*. The advantages of zinc sulphide pigments on fillers in paper and boards are not confined to the fine paper field. As an example, a mixture of bleached and unbleached sulphite fibers is often used in the manufacture of boxboard liners. Since the function of these liners is largely to hide the darker board underneath, both the reflectance and the opacity of the liner are of importance. Zinc sulphide pigment in the pulp mixture permits more unbleached fibers to be used economically with a gain in reflectance.

The ladies' program included a delightful round of golf, bridge, sightseeing around Mt. St. Helens and the Columbia River Drive, a reception at the Governor's Mansion and joint dinners and luncheons with the men.

A TAPPI special train brought many of the eastern visitors to the meeting. Arriving at Portland, the special was "held up" in true Western style by a band of Indians. A "ride" in an ancient stage coach assured the train-weary pilgrims that they were welcome. The registration rostrum indicated that over 400 TAPPI members and guests had been in attendance.

The President's Dinner was held in the evening of Monday, September 10. A most entertaining program was presented through the able master of ceremonies, Franklin T. Griffith.

Early in the evening, Mr. and Mrs. Clark C. Heritage were made honorary members of the "Order of the Rose" at an impressive ceremony.

In his address, Mr. Heritage reviewed the work being undertaken by TAPPI committees. The co-operation and enthusiasm among the members of these committees was inspiring.

What Is New in Process and Auxiliary Equipment?

A resumé covering some recent activities of machinery manufacturers of interest to the producers of paper and pulp

MANY improvements have been made within recent years in the design of mechanical equipment for use in the production of pulp and paper. Each year, it seems, has brought forth new developments of consequence. The past year or so has been no exception, and now looking in retrospect it is possible to make reference to some of them.

Production and Process Control

A process improvement in the *Chemipulp hot acid system*, as developed and worked out by *Chemipulp Process, Inc.*, Watertown, N. Y., now permits hot sulphite acid stored in an accumulator to be precirculated from the accumulator through a digester charge and back to the accumulator before the actual cooking operation begins.

Under normal conditions when a digester is ready for filling the accumulator is full of acid, heated and strengthened by the relief from previous cooks. The digester is filled with chips in the usual way and the top cover bolted on. Acid from the accumulator is then pumped into the digester through the bottom fitting. During the filling period a "vent to room" on the digester head is open, and the air displaced by the acid vented from the digester. When the acid level in the digester raises to a level near the spring line of the top dome, gas will show at the vent. The vent to room is, therefore, closed and the valve to the vent line opened. In this way the gas coming over is vented to and absorbed in the acid in an absorption tank. When the digester is full of acid the vent line is closed, and pumping continued until a hydraulic pressure of 40-55 lb. is built up in the digester. As soon as the pressure which has been found to be most economical has been pumped on the digester, the top and side relief valves are opened, and liquor is vented back through the high pressure header to an eductor and thence to the accumulator. Thus hot acid from the accumulator is circulated through the digester during which time heat has been added to the acid through admitting steam into the relief lines, the digester, or by means of other heat sources, until the temperature of the recirculated acid has been brought up to a point to create the disassociation of water and water solubles from the chips.

This recirculation requires from fifteen minutes to two hours, depending somewhat on the moisture content of the chips, the size of the digester, and other local conditions at the mill. When the top and bottom temperatures in the digester have been equalized and the desired temperature reached, the top and side relief valves are closed, the digester again pumped to the desired pressure, the acid inlet valve is then closed and the digester pump shut down. The digester is then ready for steaming and may be brought rapidly up to cooking pressure and temperature due to the advanced and almost perfect penetration.

During the cooking period, relief from the head and side is taken through the high pressure relief line, going direct to the accumulator without cooling. Towards the end of the cook, when pressure is reduced preparatory to blowing, the back pressure in the high pressure relief line is such as to prevent free relief from the digester head below a certain digester pressure. To reduce pressure below this point, the low pressure relief line is used, the gas going direct to the absorption tank, and being cooled only by contact with the recirculated cold acid.

The cold acid pump runs continuously supplying cold acid to the eductor, where cold acid is mixed with the hot relief gas and liquor, before entering the accumulator. The eductor functions both as a mixer, increasing absorption, and as a gas pump materially reducing the back pressure on the high pressure relief line. The rate of pumping cold acid is controlled by means of a needle valve in the eductor jet, and is so set that the accumulator will be full of acid as each digester in turn is ready for filling.

By this method of operation the designers of the system suggest that the major portion of the inert gases and water solubles are washed from the chips, thus bringing each chip to a uniform moisture content before the start of actual cooking. At the same time the temperature throughout the entire mass of chips is said to be equalized.

Remarkable savings in both steam and sulphur requirements as well as improvement in pulp quality are also claimed for the system. One newsprint mill, for example, that has been utilizing the system for nearly a year is stated to have consumed 176 pounds of sulphur and about 4,000 pounds of steam on an average per ton of sulphite.

Several new features have been introduced into the design of the *Trimbey knotter*, manufactured by *Trimbey Machine Works*, Glens Falls, N. Y. In this knotter, the inlet stock is directed against the sides of its plates rather than flowing into the body of the machine. Very shallow worms carry the rejects to a conical-shaped discharge end where deeper worms remove them. The plate is cleaned from the outside by a customary shower, while the rejects are also subjected to the action of a heavy washing in the last passes of the worm.

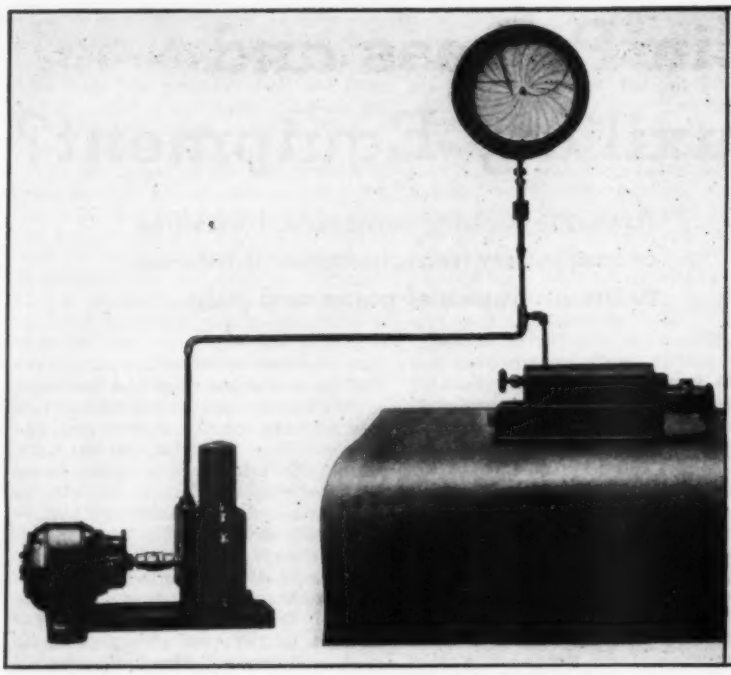
This knotter, equipped with anti-friction bearings, operates at 30 r. p. m. and uses less than 2 hp. It utilizes ¼ in. round perforations and, according to the manufacturer, will handle sulphite up to 0.6 per cent consistency and may be conservatively rated at 50 tons per day.

The *Allen-Witham, Jr.*, thin stock regulator is another recent development of the *Trimbey Machine Works*. The design of the regulator is based upon changes in the rate of separation of stock and water. These changes are utilized to actuate a combination of mechanical and electrical control device and to automatically maintain the stock at an even density. In the case of a groundwood screening system, where stock is usually pumped to the screens at the density at which it will be screened, thinning water is added automatically at the suction side of the pump. For soda and sulphite pulps, where the density of the stock from blow-pits or storage tanks varies widely, it is more practical to admit a definite amount of thinning water to the mixing box ahead of the knotters and then to vary automatically the volumetric amount of thick stock to bring this total volume to the desired value.

Pilot lights in the electric circuits indicate when stock or water is being decreased or increased, and a recording gauge gives a permanent record of the density or of the position of the valves.

Several interesting developments have been announced to aid in the preparation of stock previous to fabrication on the paper machine. Among them are the *impact beater* of *Arthur B. Green*, Needham, Mass.; a *beater roll recorder* by *Thwing Instrument Co.*, Philadelphia, Pa.; a *beater consistency indicator* by *Trimbey Machine Works*, Glens Falls, N. Y.; and an *automatic continuous recording freeness regulator* by *American Paper Machinery and Engineering works, Inc.*, Glens Falls, N. Y.

The impact beater, according to Arthur B. Green, is not expected to displace beaters, or to do precisely what beaters or Jordans now do, but rather to take the stock continuously in slush form and bring it to an unprecedented velocity. At this velocity it strikes a series of hard surfaces set approximately at right angles to the path of the stock. The shock thus sustained is the only action which the stock receives, but this impact, in the opinion of Mr. Green, oc-



Vacuum moisture recorder which measures and records moisture content of paper

Dial scale records each weighing operation and date made

curs in the impact beater more than ten times as violently as in other existing pieces of beating or refining equipment.

Impact obtained in this way is said to result in a high development of tear and fold as well as in a marked improvement in formation. Bursting and sizing effect are said to be developed with this machine to about the same degree as in an ordinary Hollander while slowness develops very little.

The place of the impact beater is stated to be in the slush line leading from the beaters to a paper machine, either before or after the Jordan, or in some instances in place of the Jordan.

The Thwing beater roll recorder provides a visual method for setting a beater roll. It is an electrical device that translates directly vertical movements of the beater roll into corresponding changes in the amount of magnetic flux through the core of a specially designed auto-transformer. The changing impulses induce similar voltage changes which actuate the sensitive recorder.

The manufacturer states that movements of the beater roll as small as ¼ of 1/1000 of an inch are easily detected and recorded by this instrument, and that fluctuations in the voltage of power lines from which the recorder is powered do not affect it. To operate the recorder a 110-volt alternating current is required.

In making an installation, the small auto-transformer is mounted either on a bracket fastened to the side of the beater or to the floor. The recorder is mounted at any desired location, ordinary insulated copper wire being used to connect the auto-transformer to the terminals of the recorder. A 6 ft. long extension cord is furnished for connecting a telechron motor, which rotates the charts, to the power line.

The beater consistency indicator of Trimbey Machine Works, designated as Trimbey-Witham, Jr., beater consistency indicator, is a simple device designed to indicate the consistency of stock in a beater at the time of filling so that more uniform density and more uniform weights per furnish may be obtained.

In this design, a comparatively small copper wheel is mounted on a shaft over the beater vat and rides upon the stock. The speed of travel of the stock in the beater sets up a corresponding speed of rotation of the wheel and through suitable gearing this speed is indicated on an easy reading dial.

It is appreciated that a "heavy" beater travels slowly. As water is added, the speed increases. Through the use of the indicator an operator is enabled to judge the amount of water or of lap or sheet pulp to be added in order to bring each beater to the uniform desired density.

Where it is desired, a recording tachometer can be added to make a record of the density of each beater and the length of time between beaters. At the same time, electrical connections and pilot lamps may also be added to show whether a beater charge is too thick or too thin or whether a beater is filled too high or too low.

The automatic continuous recording freeness regulator of American Paper Machinery and Engineering Works is stated to be sensitive to very small variations in freeness, and regulates such variations, instantly and accurately, to uniformity. It is also pointed out by the manufacturer that the regulator can operate on any kind of paper stock of normal consistencies, and can control from 5 to 150 tons of it per day.

An *improved design of shower pipe* might be mentioned as one of the recent equipment developments associated directly with the paper machine. This improved design of pipe, resulting from extensive studies of orifice design, is the product of *Sandusky Foundry & Machine Co.*, Sandusky, Ohio. The pipe is of straight hard brass drawn especially for shower pipe service with heavy bead on the outside and the full length of the pipe. The size, spacing, and shaping of the holes depend upon the desired cleansing effect. A one-piece, hard-drawn brass lip, which is slid over the bead on the pipe and which cannot become loose or fall off, spreads the water issuing from each orifice into a keen, hard-hitting jet. Acting in unison, the jets produce a straight, knife-edged sheet of water.

The lip of the Sandusky shower can be moved slightly so that it may be adjusted to present a new shower formation of original shape and effectiveness as wear occurs. Cleaning is accomplished through the use of hollow bronze cleaners which are mounted in tandem on a rod inside the pipe. A new locking device has been incorporated in this design to prevent the water pressure within the pipe from forcing the cleaner rod out into the aisle of the machine room. When the cleaner handle is turned an eighth turn clockwise, the cleaner valve is automatically compressed and the sediment is flushed from the pipe.

Both the *General Electric Co.* and *Westinghouse Electric and Manufacturing Co.* have introduced an *auxiliary wet-end drive for cylinder machines.* In the new G-E auxiliary drive, a generator

supplying current is driven from the first press shaft so that when the section is at standstill this generator will also be at standstill, and at any operating speed the speed of the generator is directly proportional to the speed desired from the section motors. In the Westinghouse drive, the operation of the wet-end section is also synchronized with the operation of the first main press by driving a direct-current generator supplying power to the individual wet-end motors from the intake shaft of the first press on the machine side of the clutch. To increase initial torque for acceleration during starting and the development of uniform torque over the operating speed range, a low voltage, separately driven booster generator is also introduced into the circuit.

Operating data for drives of this type, designed to relieve wet end felts of drag and tension, show a material reduction in felt costs per ton of board produced as well as increased sheet strength with standard machine furnish, or equal strength with inferior furnish.

Another recent development of *General Electric* is an *adjustable-voltage winder drive.* It is appreciated that in the use of electrical regenerating braking systems for the unwinding stand of paper machine winders, the maintenance of proper tension in the paper as it goes into the winder contributes materially in improving the characteristics of the rewound roll. It also serves to eliminate the maintenance, and to avoid the loss of the power dissipated in mechanical braking.

Equipment designed by the General Electric Co. for this purpose is said to give cushion starting, complete control of operating speed with good speed regulation at any speed, and substantial operating economy in the power consumed at reduced speed.

The control is so arranged that the breaking generator may be operated as a motor in either the forward or reverse direction, thus eliminating considerable manual work on the part of the attendant in carrying the paper forward to the winder.

Power readings indicate that, in addition to the benefits resulting from maintaining constant tension, the equipment provides considerable power saving, as approximately 50 per cent of the current taken by the winder motor is returned by the braking generator.

Several instruments for process control have already been described, but there are others which should be mentioned. Among them is a *pH meter*, a *white water sampler*, and a *vacuum moisture recorder.* The pH meter and the white water sampler are both products of the *Thwing Instrument Co.*, Philadelphia, Pa., while the vacuum moisture recorder is one of the products of *Cambridge Instrument Co.* of New York City.

The pH meter of Thwing Instrument Co. is said to combine in one portable instrument all the equipment necessary for making a pH determination by electrometric methods. It contains in compartments both antimony and quinhydrone electrodes and the vessels and chemicals necessary for their use.

With the quinhydrone electrodes the useful range is 0 to 8.5 or 9 pH; while the range with the antimony electrodes is 2 to 12 pH. The readings are directly in pH units on a four-inch meter, the scale being divided into tenths and readable to .02 pH.

The galvanometer is quite rugged and is sensitive to 3 megohms. The incorporation of a high sensitivity galvanometer in the electrode circuit makes it possible to use the instrument with glass electrodes, thereby extending its usefulness to bleaching and other oxidizing solutions and reducing solutions with which the antimony or quinhydrone electrodes can not be used.

The white water sampler is designed in such a manner that an ingenious arrangement of a graduated orifice automatically takes the sample in direct proportion to the flow. An electric motor and driving mechanism is contained in a water-tight casing forming the upper part of the instrument. If wanted, the top of the casing may be supplied with a window through which a revolution counter can be observed and in that way the sampler can be used as a flowmeter.

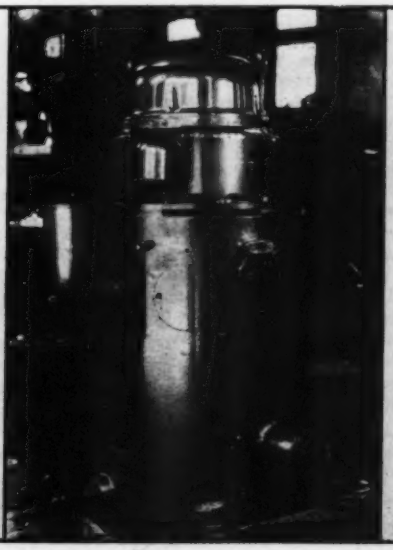
To prevent foreign matter interfering with collection of samples, the immersion feature is protected by a metal guard of streamline design; and all metal parts subject to immersion are non-corrosive.

The sampler is supported by two rods, one rod going through the lugs on each side of the operating compartment casing. One of these is hinged so that at any time the sampler can be swung out of the current and examined to see whether it is in proper condition. The only auxiliary equipment necessary is a receptacle for holding samples collected.

The vacuum moisture recorder of the Cambridge Instrument Co. measures and records graphically the moisture content of paper or other hygroscopic materials manufactured by a continuously moving process. The instrument consists of a pick-up cell or moisture meter, vacuum pump with motor, and a recorder. The moisture meter is placed close to the surface of the material being made, and as the material moves along a small portion of the air immediately adjacent to and in equilibrium with the moisture of the material is drawn into the meter on through a vacuum chamber where conversion of variations in moisture to variations in pressure is effected, and exhausted at the vacuum pump. The recorder, being on the line, is said to record the conditions regardless of whether they are uniform or rapidly changing.

The instrument is furnished in several standard ranges with open scales to cover normal working variations, or with special ranges calibrated in terms of relative humidity or percentage of moisture. Calibration may be had in

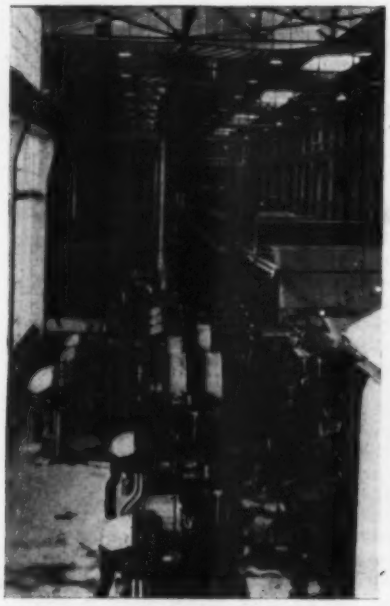
White water sampler



The Impact Beater

Portable instrument for pH determinations

percentage of relative humidity over any one of three standard ranges—10 to 50 per cent, 25-50 per cent, and 20-80 per cent.



Wet end of cylinder machine showing auxiliary drive

At this point should also be mentioned the new design of *Green's slowness tester*. In this instrument, the product of *Arthur B. Green* of Needham, Massachusetts, both the size of the central orifice of the funnel and the hydrostatic head under which it works are standardized. Thus the rate of escape of water through the central orifice is fixed. Should the drainage from the pulp under test exceed this fixed amount, it is permitted to escape through a side orifice. The water caught from the side orifice, measured by volume, constitutes the test.

Paper Testing

The development of equipment for use in the testing of paper has been particularly active. The *J. O. Ross Engineering Corporation* has introduced *a small capacity conditioning apparatus* for constant temperature and humidity rooms. This unit, patterned after the large central station type of conditioning equipment, consists of a two spray dehumidifier for cooling and washing the air, a reheating coil, a cooling coil, a fan direct connected to motor, and two water tanks. One of the tanks contains warm water direct from the sprays, and the other receives the water as it passes from the refrigerator coils.

Room conditions are maintained by means of two thermostats. One thermostat controls the steam supply to the reheater coil, thereby maintaining room temperature, and the other thermostat regulates the proper proportion of water from each of the two tanks to give the spray water temperature desired for the proper dewpoint and, therefore, the relative humidity.

The unit is generally installed with air operated control instruments, but, in case a less expensive installation is desired, electrically operated controls may be used. Likewise, ammonia, freon, or methyl chloride may be used as the refrigerant. A refrigerating capacity of one to three tons is required for one of these units.

A constant temperature and humidity box is the product of *Thwing Instrument Co.*, Philadelphia, Pa. This box, developed for testing the diaelectric equalities of Bakelite and kindred substances, is really a very ingenious arrangement as a humidifier, wet and dry bulb thermometers with electrical contacts for controlling humidity, a circulating fan, an electrical heater, and indicating wet and dry bulb thermometers as well as the material to be tested are all included in a space of 24 in. x 24 in. x 12 in. The temperature in this cabinet is maintained at any point from 95 deg. Fahr. down to room temperature with relative humidity at 95 per cent.

A fibre board tester, known as the *Carlson score and built up fibre board tester*, has also been placed on the market by *Thwing Instrument Co.* This instrument permits the measurement of the relative serviceability of different fibre boxes, and the determination of the relative values of different kinds of scores or creases. The apparatus for carrying out the test involves means for applying a combined action of tension, tearing, and repeated bending to a specimen while it is bent over and drawn firmly against a sloping edge. The tension applied to the specimen is registered by means of calibrated vernier, while a counter registers the number of bends.

An impact tester, another product of *Thwing Instrument*, has been developed to measure the resistance of heavy papers and boxboards to sudden impacts of sharp objects.

The effect of a sudden and heavy impact is accomplished by a plunger which weighs 6 pounds and falls a distance of 15 inches. The resistance of the test sample to the blow delivered by the plunger is directly proportional to the work done and this result in gram-meters is indicated on the instrument dial. The capacity of the instrument is 90 gram-meters.

When making a test the specimen to be tested is placed in position and held by a weighted platen. The specimen is always held under a uniform pressure. The pointer of the instrument is provided with a friction spring which causes it to come to rest at the position corresponding to the point where the motion of the plunger was stopped.

Gravity does the work and this established principle assures the permanence of calibration of the instrument.

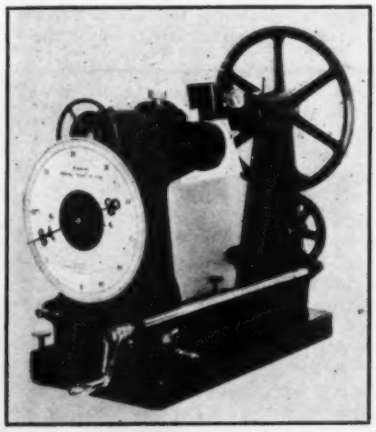
A speedy *moisture tester* for testing of paper as well as numerous other materials is being marketed in the United States and Canada by *The Alpha-Lux Company, Inc.*, 192 Front St., New York City. This instrument, which is said to be very simple to use, is so designed that a reagent used in conjunction with the sample to be tested reacts with the moisture in the sample and forms a gas. The pressure of this gas is translated into percent moisture by a gauge at the base of instrument bomb. The instrument can be supplied with gauges reading 0 to 5 per cent, 0 to 10 per cent, 0 to 20 per cent, 2½ to 10 per cent, 5 to 20 per cent, and 12½ to 50 per cent, or for other ranges, if desired. It is stated that the moisture content of most materials can be ascertained within three to five minutes with this tester.

Two other instruments for indicating moisture content with particular reference to paper are instruments manufactured by the *Cambridge Instrument Co.* One of the instruments is known as a *hand model moisture indicator* while the other is designated as a *printers' moisture indicator*.

Mounted on the under side of the hand model indicator is a small cell. This cell contains a measuring element which is sensitive to moisture and being connected with the instrument pointer causes the pointer to move across its scale. The instrument scale is calibrated to read from 10 per cent to 90 per cent relative humidity, or two scales may be employed—one showing per cent relative humidity and the other per cent water.

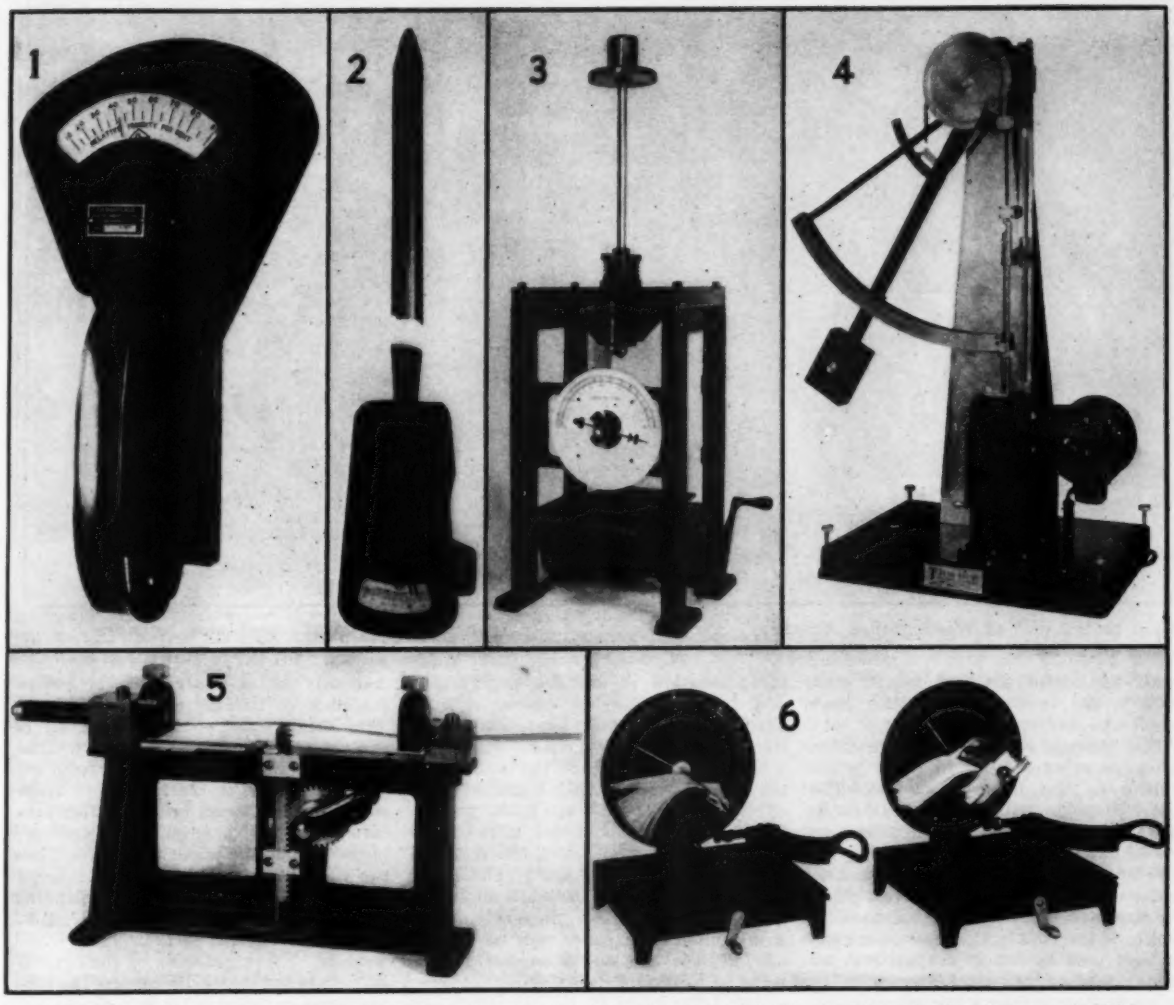
In making moisture determinations, the instrument is laid directly upon the material being tested; whereas it is only necessary to expose the instrument to the air in measuring air conditions.

The printers' moisture indicator is a small portable instrument designed to measure the moisture content of piled or stacked sheets of paper and should find application in the paper mill as well as in a printing establishment. Like the previous model it will also indicate moisture in the air.



A tester which measures the force required to start a tear

This instrument consists of a light case, provided with a pistol grip, to which is attached a thin hollow blade 1 in. wide by 18 in. long. The extreme end of the blade is perforated on both sides, and within this perforated section is located a measuring element the



1 and 2—Two models of paper moisture indicators—hand model (1), printers model (2). 3—Paper testing instrument which measures resistance to impact. 4—An all-purpose instrument for testing tension, stretch, bending, puncture and adhesion. 5—Stretch tester measures the amount of stretch in paper when testing to the breaking point. 6—The softness quality of paper may be determined with this instrument

length of which varies with changes in moisture thus causing an indicator pointer to move across its scale. The scale is calibrated in per cent relative humidity with a range of 20 to 80 per cent. To make a moisture measurement of paper in stacks it is simply necessary to push the blade of the instrument between the sheets to any desired depth and allow the moisture inside the stack to enter the perforated section of the blade.

A number of other paper testing instruments manufactured by the *Thwing Instrument Co.*, Philadelphia, Pa., should be mentioned. They include the *Clark paper softness tester*, the *squirrel-cage softness tester*, the *Thwing stretch tester*, the *Thwing tear tester*, and the *Thwing all-purpose tester*.

The Clark softness tester is made in two styles. One style is for routine testing while the other is for research work.

In the routine tester, samples of paper are held fast by a flat spring with a snap clasp. On this tester the material under test is extended beyond the clasp for a distance of 3.75 in.; while on the research tester, the length of over-hang of paper may be altered through the manipulation of an adjustable roller.

After placing the paper in either of the two instruments for testing, it is rotated by means of a handle at the front of the tester. When maximum softness is reached the paper falls; the paper is then rotated in the opposite direction until it falls. The total angle that the paper falls in both directions is used to denote the softness value of the paper under test.

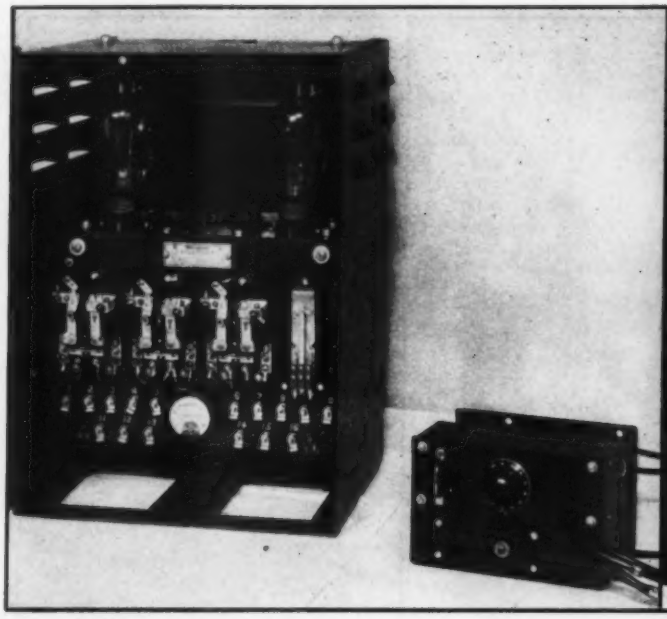
Another design of softness tester, also manufactured by the same concern, is said to be especially suitable for testing the softness quality of soft or lightweight papers such as cigarette papers, toilet tissues, absorbent tissues, and absorbent toweling.

This softness tester operates on a rotating principle using two squirrel-cage bar cylinders. The main cylinder is 5.25 in. wide by 9.5 in. in diameter. The auxiliary cylinder is 4.8125 in. wide by 2.25 in. in diameter. To eliminate friction and to increase the sensitivity of the tester, both of the cylinders rotate in sapphire bearings.

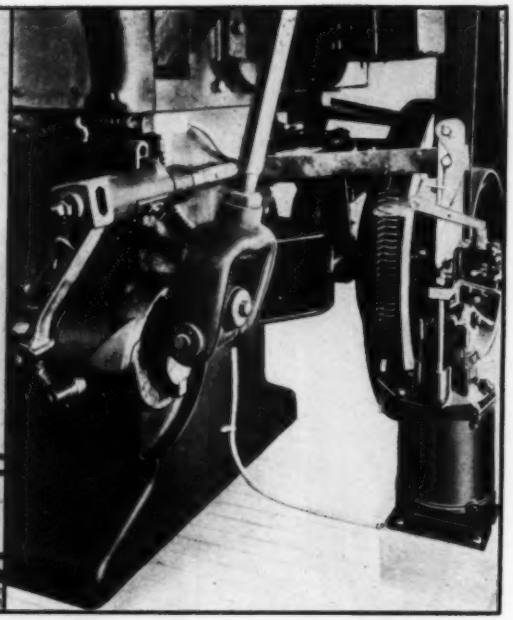
The squirrel-cage softness tester is equipped with a quadrant scale which is calibrated to read in grams per square centimeter.

In making a softness test, the test piece—115 millimeters (approximately 4.5 in.) wide by any convenient length is inserted between the two squirrel cage cylinders and subjected to a corrugating action by being rotated between them. The softness value of the paper is detected during the course of the corrugating and is registered by the indicating pointer. The pointer is provided with a friction spring which causes it to come to rest when the maximum amount of resistance of the paper to the corrugating action, between the cylinders, is registered.

The main cylinder of the instrument is also equipped with two crumpling wheels so that the crumpling-softness quality of the test sample may be determined. This test, made simultaneously with the prime softness test, takes a



Main control unit of Westinghouse register cutter regulator



Application of Thrustor mechanism to paper cutter

small section of the test sample and tests it for crumpling qualities both lengthwise and crosswise.

The Thwing stretch tester measures the amount of stretch in paper when testing to the breaking point. The tester is made with a movable jaw so that test pieces can be either four or six inches long depending upon the nature of the material. To insure testing under uniform conditions, the test piece, 15 millimeters or 0.60 of an inch in width, is inserted in the instrument and is held taut by being subjected to an initial loading of one kilogram. The paper is stretched by a movable stretching bar, which is moved in a vertical plane by a rack and pinion until the paper breaks. An indicating slide rule in the stretching bar indicates the deflection of the test piece in inches when it is subjected to a maximum constant stretching action.

The Thwing tear tester is an instrument designed to measure the force required to start a tear. In making initial tear tests a sample of material is inserted in the two jaws of the instrument and then a constant tearing force is applied by revolving one of the jaws until a tear is started in the material. The force required to start the tear is measured in "force pounds" and the result is indicated directly on the instrument dial.

This instrument will test paper products covering a wide range of weights. It may be used for testing insulating papers, newsprint, roofing felts, liner board, corrugated board, three-ply boxboard, hard fibre, and similar materials.

The last instrument for paper testing to be mentioned is known as the Thwing all-purpose tester.

The instrument can be used for testing such physical characteristics of paper as tension, stretch, bending, puncture, adhesion of tape on paperboard, and for tearing plies apart. Special adaptations have been made for "pick" testing the coating of paper.

In general appearance, the instrument resembles the usual tensile strength machine. There is, however, a full ground surface on the top of the base of the instrument as well as on the front of the upright member. This provision has been made to permit the addition of any devices to any tester in service with a minimum of expense and trouble, if any devices are added to the instrument at any time.

Converting Equipment

Among the equipment developments for improving the efficiency of paper converting operations might be mentioned a *paper roll centering chuck* of *The Medart Company*, St. Louis, Mo.; *adaptation of a Cuno filter to straining paper coating material*, a *sectional motor drive for a paper coating machine* by *Westinghouse*, a *Thrustor-operated paper cutter* by *General Electric*, and a *register cutter regulator* by *Westinghouse*.

The Medart paper roll centering chuck has been designed to assure proper alignment and complete protection of both paper mandrel and paper roll. The chuck consists of only a few major parts, namely, a torque member with a torque wedge welded to one end and threaded at the other, a sliding wedge which slides over the threaded end of the torque member, two expanding shells with spring keepers which fit over the torque member and are positioned between the torque wedge and the sliding wedge, and a handwheel received by the threaded end of the torque member and which expands the expanding shells when turned down against the sliding wedge.

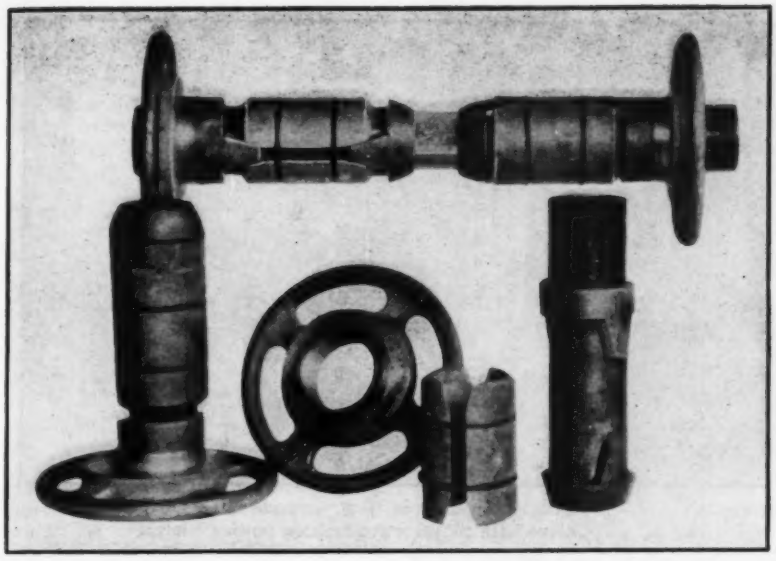
In using the chucks, one may be permanently set at the right-hand end of the shaft by turning down a set screw. This chuck lines up the paper roll in the desired location on the shaft. The free end of the shaft, with the expanding shells collapsed to their smallest diameter, is then inserted into the paper tube core until the expanding shells are completely inside the paper tube core. Then the sliding wedge, turned back into position, is entered into the expanding wedge space and the handwheel pulled up tightly with a 10 or 12-in. valve wheel wrench. This tightening of the expanding shells automatically centers the tube and grips or "chucks" it into place.

The left-hand chuck is slipped over the extending shaft and positioned in the same manner as described for the right chuck.

The Cuno filter for use in connection with paper coating machines for straining the coating material is the product of The Cuno Engineering Corporation, Meriden, Conn. It is understood that the application of this filter to this service has made it possible to eliminate imperfections in the coating which previously had caused rejections and spoilage.

The new sectional motor drive for a paper coating machine, as developed by Westinghouse Electric and Manufacturing Co., includes the use of an adjustable-speed d-c. gear-motor on each section of the machine, namely: coating rolls, brushing unit, dryer, push rolls and reel. There is, of course, proper control for obtaining inching, threading-in, and the different normal operating speeds.

The loop that must be maintained between the coating rolls and dryer section is maintained automatically by photo-electric control. If the loop becomes too long, the dryer motor is speeded up; while if it becomes too



Paper roll centering chuck

short, the dryer motor speed is reduced. The motor driving the pull rolls operates as a motor part of the time and as a generator most of the time to provide a constant tension on the coated paper as it is reeled. A tension regulator on the reel motor assures constant paper tension throughout the winding operation from empty reel to full roll.

The application of a Thrustor mechanism by the General Electric Co. to the operation of a paper cutter was developed to provide maximum protection for operators of guillotine-type machines, the Thrustor being arranged to engage the clutch mechanism which connects the knife to the flywheel and motor.

Between the Thrustor and the clutch mechanism is a link which includes a solenoid-operated latch. The solenoid maintains the latch in the closed position and the Thrustor closes the clutch against the pull of a powerful spring. Two push-button stations must be closed simultaneously, so that both hands of the operator are thus occupied while the cut is being made. If the operator removes one or both hands from the push buttons, the solenoid is de-energized, the latch released, and the knife stopped.

Cam-operated limit switches make it impossible for the cutter to repeat its stroke, even if the operator maintains his hands on the push-button stations. The operator cannot block out one push-button station and operate the cutter with the other one; it is necessary to release each push-button station at the top of the stroke before another stroke can be made.

The Westinghouse register cutter regulator is a device for regulating the high speed cutting of paper, cellophane and similar materials in accordance with printed matter, labels or other patterns where both forward and reverse correction of the position of the material is required. The equipment preferably is arranged to operate from phototubes, receiving impulses from a spot on the paper, but operation may be obtained also from contacts operated by a small perforation in the material or by a conducting section. The equipment comprises three units, namely, a Phototroller which contains an amplifier, relays, and control equipment; a "scanner" which consists of a light source, phototube housing and accessories for scanning the paper; and a "synchronous selecter," a rotary limit switch which selects the direction of the corrective action.

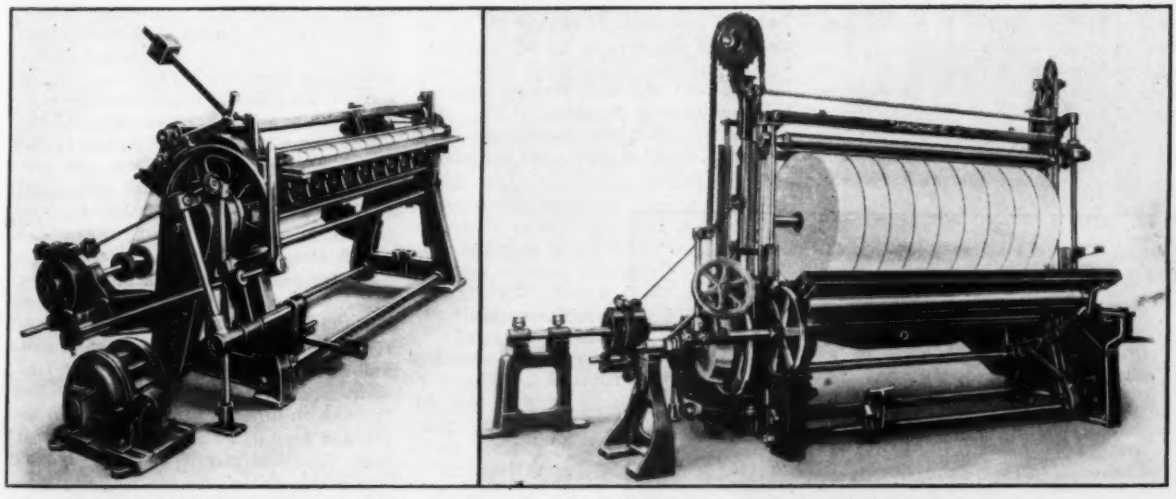
Among the applications suggested for this regulator are the cutting of plain or waxed paper for bags or packages for coffee, bread and similar products, and the cutting of cardboard or corrugated paper with respect to definite length of printed matter.

Two new slitters have also been announced by the *Cameron Machine Company*, Brooklyn, N. Y. One of these slitters, designated as Type 10-5 Special, is designed to run at 1500 f. p. m. operating speed, slitting and winding rolls of all kinds of plain, waxed, gummed and coated papers. This machine is built in widths of 42, 52, 62, and 72 in. and accommodates a mill roll 32 in. in diameter and rewinds rolls to 30 in. in diameter. Cutters may be set to widths from ⅝ in. wide and upward. Another important feature of this machine is the use of new type sharp edge self-contained cutters.

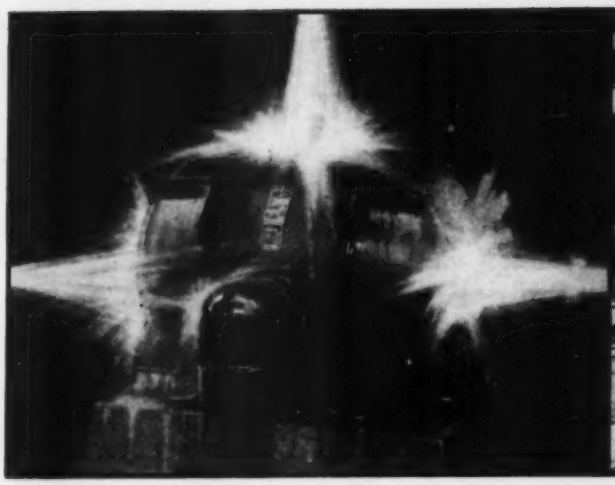
The other machine, Camachine 40-1AF, is especially designed for the production of head rest rolls, shelf rolls, lunch rolls, etc. It is built in widths of 26, 32, 42, 50, 56, and 62 in.; accommodates a mill roll 32 in. in diameter; and rewinds rolls to 10 in. in diameter. Cutters may be set to widths from ½ in. up, or special narrow slitters may be spaced to cut widths down to ¼ in.

Generation and Transmission of Power

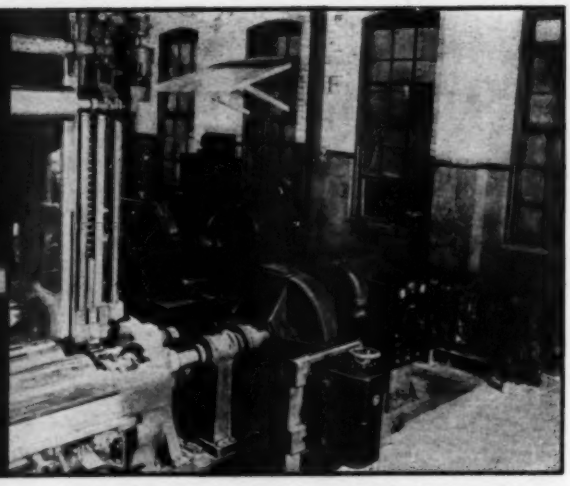
Several manufacturers of equipment for the generation of steam and the dis-



Two new designs of slitters. Machine at left for head rest rolls, shelf rolls, etc. Machine at right for all kinds of plain, waxed, gummed and coated papers



Splash-proof motor for installation under extreme moisture conditions



Installation view of G. E. variable-voltage winder drive with regenerative-braking tension control

tribution and transmission of power have been active within recent months in the development of new or improved designs.

A new boiler unit has been announced by *The Babcock & Wilcox Company.* This unit has been designed to provide a completely co-ordinated unit comprising a two-drum boiler; a water-cooled furnace; burners for liquid, gaseous, or pulverized solid fuels; and, when needed, a superheater, economizer, and an air heater.

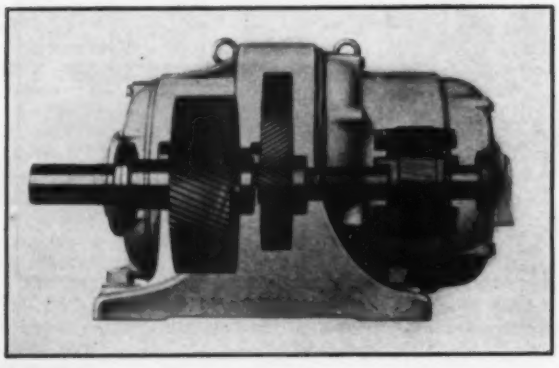
The furnace is water-cooled to assure low maintenance costs and minimum outage for repairs and replacements. The boiler tubes, arranged in three passes, are spaced to secure maximum heat transfer consistent with a draft loss that is sufficiently low to permit operation with natural draft up to fairly high ratings. Tubes in the first pass are 3¼ in. in diameter while the diameter of those in the succeeding passes is 2 in. The drums are of fusion-welded or, if desired, riveted construction. Fuels, such as pulverized coal, oil, or gas can be fired singly or in any combination, and conversion from one or any combination of these fuels to another can be accomplished without any changes to the boiler or furnace.

The manufacturer suggests that this unit is particularly applicable in industrial plants where operation at high nominal ratings with high final steam temperatures, and high efficiency is desired.

The Green natural draft chain grate stoker has been redesigned by *Combustion Engineering Company, Inc.*, New York City. Instead of a cast iron frame supported on wheels, as formerly employed, the new design, designated as the "KS", has a stationary structure, fixed into the setting. This consists of transverse channels supported on posts at either side, to which, in turn are fastened angles parallel to the side walls; skids supported on I-beams carry the weight of the chain at the bottom. A pipe, flush with the side wall, and extending nearly the length of the stoker, carries the adjusting rod and takes the tension off the frame. While the take-up in the tension of the chain is at the rear, the actual adjustment is at the front which is always accessible.

With natural draft, zone control may be applied, if desired, by placing louvre dampers between the channels in one or more compartments. Where conditions make it desirable to change to forced draft, this can readily be accomplished by substituting forced draft links, adding dampers and installing an internal seal and hood at the front.

A water-cooled rear shaft such as is used on the forced draft type is optional with the design.



A self-contained motor and geared transmission assembly

A second development of *Combustion Engineering* is the adaptation of the *Coxe stoker* to wider furnaces by bringing out what is designated at the "CD Design."

This design employs two or more carrier bars placed end to end instead of a single bar across the stoker as in the older design where the length of the bar was necessarily limited in order to avoid warping. These bars carry cast-iron keys the overlapping construction of which prevents ash being carried back to the front of the stoker.

The stoker body is built up of structural steel cross members which, in turn, support the skids and grate surface. As in the smaller design the stoker is driven from the rear shaft with the take-up for the driving chains located at the front.

The new design applies to furnace widths of 12 to 24 ft. whereas the older type, with the single-bar design was limited to 11 ft. 8⅝ in.

A new self-contained stoker unit, designated as Type S and intended for small heating and industrial plants having either fire-tube or water-tube boilers, has also been brought out by the same manufacturer. This unit has a screw conveyor which advances the coal from the hopper to the entrance of the retort and a reciprocating pusher in the retort continues the feeding and provides agitation for the fuel bed. Coal distribution is accomplished by the lateral movement of moving grate bars which alternate with fixed bars.

An integral blower, with inlet damper control, supplies air to the windbox under the stoker. The volume of air is regulated automatically through a control lever to suit the stoker speed. A constant speed motor drives the stoker through an integral variable-speed transmission permitting sixteen rates of coal feed. Coal feed may be cut off by means of a clutch so that the fan may continue to operate for burning out the fuel.

Another stoker development is that of the *Link-Belt Co.*, Chicago, Ill. This con-

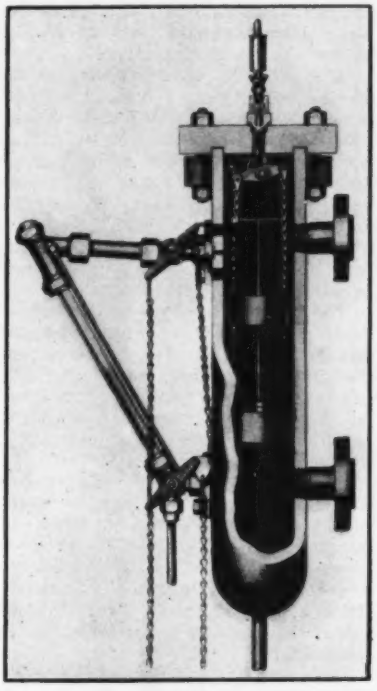
cern has brought out an automatic underfeed screw stoker which is made in a number of sizes suitable for heating plants and smaller steam plants and for boiler capacities from 10 to 250 B. H. P. This unit is equipped with the Link-Belt variable speed stoker drive. Among the salient features claimed for it are: easy accessibility of working parts; automatic electric controls for operating at pre-determined boiler pressures; a chrome steel screw feed conveyor; variable speed drive for regulating coal feed, with safety shearing pin for overload protection; and a unique design of motor mounting which permits direct connection to forced draft fan.

Another contribution of *Combustion Engineering* is that of a *steam washer* for placement within the steam drum of a boiler to reduce the solid contents of the outgoing steam. Where all steam from the boiler tubes and water walls enters on one side of the drum a single washer arrangement is employed. If steam enters on both sides of the drum a duplex arrangement of washers is necessary. The manufacturer claims that by thus washing the steam with fresh feedwater it is possible to reduce the solid carry over to approximately one per cent of the solid content of the incoming boiler feedwater.

To guard against explosive mixtures of fuel and air when lighting off pulverized coal, gas, or oil fired boilers, *Bailey Meter Company*, Cleveland, Ohio, has developed a *control trip* which withholds the fuel feed until the boiler is thoroughly purged. The mechanism consists essentially of two oil-sealed bells suspended from a beam to measure air flow through the boiler, a snap-acting contactor, and an indicating pointer. Although the indicating pointer is provided for calibrating and checking, its primary function is to operate the snap-acting contactor. This contactor is connected to the air-flow mechanism by linkage in such a manner that it is necessary to run the rate of air flow through the boiler up to approximately 60 per cent of capacity before the contactor snaps closed and permits operation of the fuel feeder motor relay or control valve. Once this contactor goes to the closed position it remains there until the air flow value approaches zero, thereby permitting operation of the unit throughout its entire control range without tripping out the fuel feed.

Cross-sectional view of Green natural draft chain grate stoker

Several important improvements in the *Yarway floatless Hi-Lo water column and Sesure inclined water gauge* have also been announced by the *Yarnall-Waring Company*, Philadelphia, Pa. The use of balanced solid weights working on displacement principle to operate the whistle alarm at high and low water levels, the attachment of gauge valves directly to water column with chains set back from gauge glass to allow clear vision of inclined water level and to prevent strain on the glass by chain pull, and the gauge glass inclined from vertical to permit reading water levels from below are the standard Yarway features which have been retained. The improvements include a smaller, lighter water column body; a simpler, more flexible and more responsive operating mechanism for the Hi-Lo alarm; and an inclined connecting member at top of gauge which drains back the condensate that might otherwise collect at this point and cause erosion and corrosion of the glass.



Improved design of Yarway water column and gauge

A new photo-cell smoke density recorder is another new development of the *Bailey Meter Company*, Cleveland, Ohio. This equipment consists of a receiving element in the form of a recorder which is usually mounted on the individual boiler panel board, and a transmitting element consisting of a projecting cylinder and a detecting cylinder which are mounted on opposite sides of the breeching or flue gas passage.

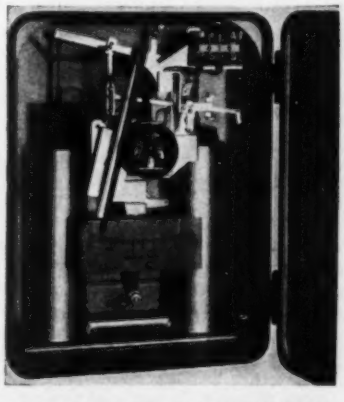
Two photo cells are employed in the transmitting element, one in the projecting cylinder and the other in the detecting cylinder. Full luminous flux from the light source is received by the compensating cell in the projecting cylinder at all times, regardless of the smoke density within the gas passage. However, the cell located in the detecting cylinder on the opposite side of the gas passage receives light of varying intensities depending upon the density of the smoke in the passage, to the intensity of illumination.

Variations of light source intensity are compensated by connecting a calibrating potentiometer in series with the detecting photo cell and a recording potentiometer in series with the compensating photo cell. Negative terminals of both cells are connected so that they will be at the same potential.

Intensity variations of the light source change the output of each cell in the same proportion and the position of the recording potentiometer is determined by the ratio of light intensity received by the two cells, and therefore records the relative smoke density at all times, regardless of such factors as voltage variations and loss of incandescent lamp efficiency.

New motor design developments would include the *Syncrogear motor* of *U. S. Electrical Manufacturing Co.* of Los Angeles, Cal., *splash-proof motors* of *Fairbanks-Morse & Co.*, Chicago, Ill., and *Westinghouse Electric and Manufacturing Co.*, East Pittsburgh, Pa., and *a line of totally enclosed, fan-cooled direct-current motors of General Electric Co.*, Schenectady, N. Y.

The Syncrogear motor, a development in geared electric power, does not follow the practice of mounting a train of gears on one end of a standard motor frame. Rather it is a self-contained motor with a single base embodying a geared transmission which is supported by a heavy gear pedestal base designed to withstand the unusual torque strains in high-torque geared reductions. The complete assembly occupies practically no more space than an ordinary electric motor; a fully enclosed gear compartment excludes foreign matter; and the highest speed gears, to prevent oil foaming and resistance, are not completely submerged in oil. It should also be mentioned that gear ratios may be subsequently changed at place of installation.



Control device to prevent explosions in the operation of boiler units fired with fuels in suspension

The splash-proof motor of Fairbanks, Morse & Co. has been developed for installation in locations where the pro-

duction process necessitates exposure to splashing or extreme moisture conditions.

The motor is made with a heavy solid cast frame and special solid cast end bells, each containing a suitable air duct and special air opening at the bottom slightly above the level of motor feet. These air ducts are provided with removable perforated baffles which protect the motor from water splashing directly into the air ducts and provide unobstructed ventilation for the windings. Cooling air is drawn through these ducts by means of an exhaust type fan on the pulley end of the motor.

The new splash-proof motor of Westinghouse is of the squirrel cage type. Its motor frame and end brackets are of solid cast iron. The end brackets contain a system of baffles which permits a flow of ventilating air to the motor interior without allowing liquid to enter.

A system of dual ventilation is utilized in the new line of direct current motors introduced by the General Electric Co. for applications where dust, dirt, moisture, or other foreign matter is present in large quantities.

This system of ventilation together with water-tight conduit boxes, and labyrinth seals at the cartridge-type bearing housings protects the working parts of the motor. An internal fan draws the warm air from the windings and core and circulates it around the totally enclosed interior of the motor so that it gives up its heat to the frame and end shields. An external fan draws cool air in through mesh openings in an outer end shield and directs it over the surface of the magnet frame and inner end shields. Close clearances between the end shields and the bearing housings, and grease seals along the shaft, prevent foreign particles from entering into the motor.

Additions have also been made by several manufacturers to their lines of power transmission equipment.

Two new series of *completely enclosed and protected ball bearings* have been brought out by the *Norma-Hoffman Bearings Corporation*, Stamford, Conn. One of these bearings, designated as the *7000-P series* bearing, has a felt seal at one side with a pressed metal side shield at the opposite side. The bearing has the same width as the standard 7000 series which the manufacturer has been producing for a number of years.

The other bearing, *77000 series*, has a double felt seal—a felt seal at each side. It is a completely protected dust-proof bearing with a large capacity for grease. This bearing is intended primarily to make possible economies in the bearing mounting by making it unnecessary to provide supplementary closures for protection. The seal itself consists of very substantial felt washers held in position with steel snap washers which can be removed for renewing the supply of grease in the bearing and for inspection.

In keeping with today's trend toward the aesthetic in designing, the Link-Belt Company, Indianapolis, Ind., has given a new dress to the *Link-Belt silent chain drive* by bluing most of the chain and by treating the washers and guide bars to give them a silvered appearance. The bluing of the bulk of the chain has the effect of placing the silvery parts on a dark blue background.

The tradename, *Silverstreak*, has been adopted for this modernized chain which is made in all standard types.

A new coupling of the gear type and having quadruple engagement has been brought out by the *John Waldron Corporation*, New Brunswick, N. J. In this coupling the two hubs carry external teeth; the one piece cover has internal teeth at the ends; and between each ring of hub and cover teeth is placed a torque ring which has internal teeth meshing with the hub teeth, and external teeth meshing with the cover teeth.

The coupling is closed at the ends by bolting two end plates with corresponding gaskets to the cover. The bolts used for this purpose carry no load, but simply insure a tight joint. A plugged hole at the center of the cover permits the addition of a heavy duty lubricant to the coupling interior.

The weight of the cover is carried on the torque rings and hubs at points which are submerged in lubricant, the torque rings being loosely held in recesses of the cover so that they can move freely under misalignment and yet form a convenient unit with the cover when the coupling is assembled or disconnected.

This coupling is built to take care of shaft diameters from 1⅞ in. up and because of its design is grit, dust, vapor, and moisture proof.

Another new power transmission development is a self-adjusting, positive variable speed transmission for fractional horsepower duty. This drive, known as the *V. R. D.* and a development of the *Link-Belt Co.*, Philadelphia, Pa., is capable of a horsepower output of ½ hp. at maximum speed with a maximum ratio of speed variation of 10 to 1.

Novelty in the V. R. D. consists in the construction and application of the chain which is used for transmitting the power from input to output shaft. It is side-contact roller chain, consisting of steel links, made endless and connected by hardened steel pins in hardened steel joint bushings.

Openings in each pitch of links provide a pocket for each of two hard steel rollers, and from both sides a portion of roller protrudes sufficiently to permit each pair of chain rollers, at each engagement of chain and wheels, to roll into contact with the hardened steel conical opposed discs forming the driver and driven wheels, until finally the chain is engaged positively in the wedge-shaped wheels at the proper pitch line for the speed desired on the output shaft. The disengagement of chain is a smooth, rolling action.

A speed indicator permits ready check-up on operating speed settings. Spring pressure applied to the two discs of one wheel serves to maintain correct tension and compensate for natural chain wear automatically.

Pumps, Piping and Valves

Attention has been given by some manufacturers to the development of equipment for use in the transportation of liquids or of materials suspended in liquids.

In this connection, *a newly designed pump* for the chemical and process industries has been introduced by *Buffalo Pumps, Inc.*, Buffalo, N. Y. This pump, made in both full ball bearing and close-coupled models, has been designed to take advantage of the higher efficiency and general all-around satisfaction obtained with closed impellers. Features include extra deep stuffing boxes with clear water connection to seal the box against solids or abrasive materials; shell, side plate and shaft are protected by renewable wearing parts; and shell may be revolved to provide several positions of discharge.

The full ball bearing model has a sturdy bearing stand and casing mounting ring. Bearings, spaced to take care of overhung impeller construction without setting up vibration in the shaft, are oversize and have sufficient capacity to operate at speeds up to 5000 r. p. m. A built-in labyrinth seal at outer face of each bearing protects it against the entry of foreign matter, and further bearing protection is added by the close fit of the bearing housing around the shaft.

The other type pump, the close-coupled model, is identical with the full ball bearing model except that it is close-coupled to an electric motor. This arrangement does away with the necessity for ball bearings, the impeller being overhung on the motor shaft.

Another pump development is that of the *DeLaval Steam Turbine Co.*, Trenton, N. J. This company has introduced a continuous displacement pump known as DeLaval-L MO, for supplying oil burners with oil at constant pressure. This pump, having an action like that of a piston acting continuously in one direction, gives steady pressure for the burners. In addition, it is adapted for either steam turbine or electric motor drive; and, when turbine driven, through the use of a pressure governor to regulate turbine speed, may be readily controlled to develop constant pressure irrespective of the number of burners in use.

A complete line of light weight die-formed steel fittings including elbows, tees, laterals, and reducers for light wall and spiral pipe is now being manufactured by *Taylor Forge & Pipe Works*, Chicago. These fittings, in plain steel, asphalted, or with galvanized coating, are available in inside diameter sizes from 3 in. up to and including 16 in., and are furnished with either plain ends, flanged ends, or with one end plain and the other end flanged.

Fabricated from No. 10 gauge (.134 in.) steel by welding, they are suitable for hydraulic pressures of 200 lb. per sq. in., or more on the smaller sizes.

A new type valve, designed especially for paper mill service, has been developed by the *DeZurik Shower Co.*, Sartell, Minn.

This valve employs a conventional plug-type valve body with a seat formed about one of the ports. The face of the seat is made on an eccentric as is likewise the face of the rotor employed for closing the openings. Due to this eccentric construction of the seat and rotor, the entire rotor face, as soon as the rotor is turned slightly from the closed position toward the open position, is immediately drawn away from the contacting surface of the valve seat. In other words, the rotor becomes immediately spaced from the valve seat during the initial part of the opening movement of the rotor.

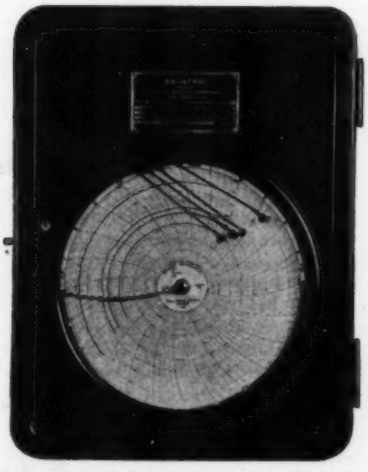
It is claimed that this valve because of its eccentric rotor and seat will open and close under all conditions without sticking or seizing of the rotor in the body. It is further claimed that the presence of a film of corrosion, which is formed inside of stock lines, does not affect its easy operation.

Various sizes of this valve open to the full area of the pipe size for which they are built. An internal stop is provided at the full open position and the rotor may be set in any position throttling the flow as desired. An indicator is provided as a matter of convenience to show just how much the valve is opened.

The manufacturer suggests that this valve is especially adapted for service on paper and pulp stock, size, clay, starch, alum, bleach, white water, clear water and other places where the use of a quick opening valve is desirable.

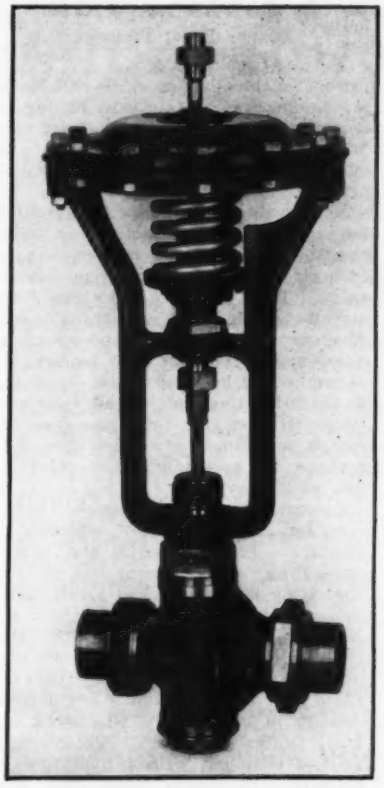
Miscellaneous Developments

A number of other equipment developments, perhaps of a more miscellaneous character, might be mentioned.



Potentiometer pyrometer which records temperature from as many as four thermocouples

One of them is a *potentiometer pyrometer* developed by *Bailey Meter Co.*, Cleveland, Ohio. This pyrometer, named *Galvatron*, after the galvanometer-electronic relay circuit which it employs, is designed to make a continuous record on a circular recording chart of temperatures from as many as four thermocouples. Each of the records would be distinguished from one another through the use of a different color of ink in each recording pen.



Diaphragm motor valve with molded rubber diaphragm

The *Synchro valve*, a diaphragm motor valve, is a comparatively recent development of *The Bristol Company*, Waterbury, Conn. This valve is of the V-port balanced type with a molded rubber diaphragm to conform with the contour of its cover. It is available in two sizes of tops, one for valve sizes from ½-in. to 2-in. inclusive, and the other for valve sizes up to 4-in. The design of the diaphragm is said to eliminate folds in diaphragm and to result in smoother valve action.

A grinding wheel made from genuine South African diamonds is another contribution of *The Carborundum Company*, Niagara Falls, N. Y. to industry.

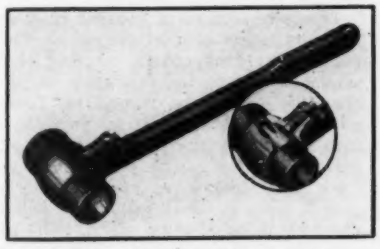
The diamonds used in the manufacture of the new wheel are not of the so-called black or carbon type. They are yellows, white and greys of the gem diamond variety, but of course are sufficiently off-color and in such small sizes or weights as to be not desirable as gems. By a special process the diamonds are crushed and the diamond grains or grits most accurately graded through a series of standardized screens.

The new wheel is made in three grits, the comparatively coarse, 90 grit; the fine, 220 grit and the extra fine, 400 grit. With this range of grits it is possible to do comparatively rough grinding or stock removing with the coarse wheel, to produce an edge which is said to be superior to a lapped edge with the fine wheel, and to create an exceedingly keen edge and a mirror surface finish, where such finish is required, with the extra fine wheel.

A dial scale with an automatic recording feature which makes an accurate and permanent record of each weighing operation and the date it is made has been introduced by *Fairbanks-Morse & Co.*, Chicago, Ill. The scale may be arranged for either dry or wet weighing and may be fitted with either tank, suspended hopper, or platform as the installation may require. This same scale may also be provided with an automatic cut-off to stop the flow of material being weighed at any preset amount.

The Lunkenheimer Company, Cincinnati, Ohio, has changed the design of their *Fig. 1183 automatic liquid gauge*. All internal working parts—stem, gland, retaining ring, stuffing box washers and ball checks are now made of stainless steel to provide maximum resistance to corrosion and eliminate sticking. The new pressure rating for the gauge is 350 lb. G. L. P. (Gas-Liquid) at 450 deg. Fahr. temperature.

Another interesting item of equipment development, the last to be mentioned in this resumé, is that of a *reversible ratchet* wrench by *Wendnagel & Company*, Chicago, Ill. This wrench was developed for use in the tightening of hoops on large wooden tanks, such as sulphite acid storage tanks, blow tanks, blow pits, and stock chests. The ratchet feature allows complete tightening or loosening of a hoop without lifting the wrench from the nut. It is only necessary to change the position of a small pin, which is easily operated, if it is desired to reverse the operation from tightening to loosening or vice versa.



Novel design of wrench for use on hoops of large wooden tanks

The wrench is made in five sizes, each size being equipped with a detachable socket to fit two sizes of hexagon nuts. The socket of the smallest wrench fits nuts of hoops, rods, and bolts of ½ in. and ⅝ in. sizes, while the largest wrench is for a socket that fits nuts of 1 in. and 1⅛ in. The intermediate sizes, of course, are for nuts between the sizes mentioned.

In this resumé it hasn't been possible to record all equipment developments of interest to pulp and paper manufacturers. This extensive summary, however, is indicative of the activity of various manufacturers to improve their products, increasing the efficiency of operations within pulp and paper mills.

Tissue Selling Observations

By EDWARD J. WHITE
Peavey Paper Products

THE toilet tissue division of the paper industry, while immeasurably better off than two years ago in regard to price obtained for this class of merchandise, is still in a chaotic condition. Conscientious purchasing agents put the responsibility upon manufacturer's agents and the manufacturer. The latter group accuses the buyer as a direct cause for this deplorable condition. Both groups are swayed in their actions by a subtle psychology which might be termed mass depression mindedness; or to state it in another way, both groups are conscious of the mass demand for acceptable merchandise at the lowest cost to the consumer. The responsibility for leading the industry out of this morass of price-consciousness can not be shouldered by any one mill or any one jobber, but must be assumed by the group.

Assume that the manufacturer's representative is worthy of his hire, and that he knows his product as well as that of his competitor. He knows, or should know, how it is manufactured, the furnish and quality of the product used, and can answer intelligently why his merchandise is worth a specified sum. In other words, he is in a position to analyze cost not only of his own product, but also approximate that of his competitor.

This knowledge of the salesman is seldom made use of by purchasing agents. Why they do not desire it may be attributed to either a lack of understanding of the salesman's knowledge or that it is taken for granted by the buyer, that the item purchased is the "same as" or "just as good as" another product of the same industry.

Tissue buyers, as a general rule, are inexpert judges of intrinsic value. They place individual orders totaling thousands of dollars for this class of merchandise for their respective houses with no thought of inquiring very deeply into specifications covering quality and furnish. Price is the powerful factor. They may look over several rolls of tissue, from as many mills, and believe them all to be of equal merit. The personality of the salesman, sentiment, or price is subsequently the determinant rather than logic and good business judgment.

"Numerous instances are recalled where all I had to do was to sit back and listen without showing much enthusiasm about the transaction and the salesman would cut his price voluntarily," stated A. H. Fitzgerald in an interesting article in the May, 1934, issue of THE PAPER INDUSTRY. What Mr. Fitzgerald has stated is quite true, but a salesman who cultivates the art of friendship seldom meets with this experience. The salesman, however, who puts his proposition solely upon a business-like basis meets with this experience very often and there is nothing quite so exasperating. It is an invitation to do one of two things—end the interview, or cut the price. On the other hand, there is nothing so encouraging to a salesman as an appearance of interest on the part of a buyer. Under this stimulation any amount of legitimate information can be drawn from the salesman.

Not for the purpose of discrimination but rather that of clarification, it is commonly known that Hebrew buyers, as a class, are very shrewd in this respect. They give the salesman their attention while he has something to say. They are good listeners and are good questioners. This usually flatters the salesman and he reciprocates by giving as much information as is ethically possible. Granted that this agent does not buy, it puts him in a position at least to evaluate his merchandise in respect to that of others.

Of course, it must be assumed that in relaying information the salesman is truthful. Truthfulness is the largest asset of any mill representative and prevarication is by no means a salesman's monopoly. The code price under the N. R. A., to some extent, has eliminated the practice quite prevalent at one time by a certain class of buyers. However, there still can be found a few buyers, usually in large cities, who work one mill against another. Their usual method is to use written quotations of doubtful age, verbal prices from competing mills, and veiled half-truths — the most difficult to detect.

Then there is the anathema of all salesmen — purchasing agents who are always on the alert for a distributor's five per cent. As a class, they are very shrewd and intelligent traders. They demand and accept nothing but the best merchandise and in return they are willing to give large volume. Their favorite method is to divide their business between two or more mills and then angle the salesmen with a large order—a cruel but seemingly effective method.

Of course the foregoing presents only one side of the picture. Fortunately there is a large group of purchasing agents who must be sold and are willing to pay market price for honest merchandise. This type is usually found in old established firms with a reputation for maintaining fair and equitable prices. With them there is no haranguing over price, no disputing of terms, no special discounts. Their example must be the foundation stone upon which the tissue industry will build order out of chaos.

The great majority of purchasing agents concentrate their entire attention upon their particular firm with no thought that their acts may have effect upon the industry as a whole. This majority may be compared to the small politician who works only for the vote-getting measures regardless of the best welfare of the state. The buyers will readily grant that good government demands more statesmen and less politicians. The purchasing agent can become the statesman of his own firm if his purchases will but reflect the consciousness of the needs of the entire tissue industry. Statesmanship in business is as much a matter of fact as statesmanship in government.

In some cities unfair buying has such a grip on the group that the individual buyer must follow suit in order not to jeopardize the interest of the firm. This condition is the direct result of unintelligent competition and can be remedied by intelligent co-operative effort.

Purchasing agents as a group should be educated to appreciate the fact that what practices they indulge in are bound to affect the welfare of the group, and that sooner or later unfair buying will act as a boomerang. No man is shrewd enough to buy for less than his competitor all of the time.

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◆ Hisey Succeeds Morgan at New York State Forestry College

W. Oury Hisey will succeed Howard W. Morgan as instructor in Pulp and Paper Manufacture, Department of Pulp and Paper Manufacture, New York State College of Forestry, Syracuse, N. Y. October 1. Mr. Hisey comes from P. H. Glatfelter, Spring Grove, Pa., a large book paper manufacturer and Mr. Morgan will take a responsible position with the Institute of Paper Chemistry at Appleton, Wisconsin.

Mr. Hisey is a graduate from Willamette University, Oregon, having received the degree B. A. in chemistry in 1924. The following year he took the pulp and paper courses at the New State College of Forestry and was then employed for four years by the Oxford Paper Company in their research laboratory and as superintendent of the paper coating division. While with the Oxford Company he completed the night school courses at Columbia University in physical chemistry, advanced organic chemistry, hydraulics and chemical engineering. Subsequently, he engaged with the Celotex Company as chemist in charge of pulp and paper research. During a period of three years with that concern he completed courses at Northwestern University in economics, accounting, finance and statistics for the degree of Master of Business Administration. During the last year and a half Mr. Hisey has been chief chemist and pulp mill superintendent for P. H. Glatfelter Company, Spring Grove, Pa.

The Department of Pulp and Paper Manufacture is under the direction of Prof. Clarence E. Libby. Floyd C. Peterson is assistant professor. In addition to Mr. Hisey who is on the regular staff, there are two student assistants in the instructional work in this department—Arthur Barry, '32 and Frederic G. Barber, '34.

National Safety Council Holds Twenty-third Annual Meeting

THE fervent welcome given by the City of Cleveland, Ohio, to the delegates at the Twenty-Third Annual Congress of the National Safety Council, October 1 to 5, was an exhibition of that eagerness and determination which is typical of all sections of the country, that the alarming rate of increase in accidental deaths and injuries in industry, homes, highways and elsewhere must be checked by intensified educational programs and the Council's other unremittent and insistent efforts.

One of the contributions to the success of the Congress on the part of the Cleveland Safety Council was the placing of attractive posters at street and highway intersections throughout Cuyahoga County warning the public to avoid accidents and watch the children.

Public Safety is now particularly under the spotlight since it is expected that the motor vehicle death rate will show an increase of twenty per cent over 1933.

President John E. Long, of Albany, N. Y., in his address at the Annual Meeting on Monday morning, gave several reasons for these increased deaths, among them being worn out vehicles, faster cars, increased use of alcoholic liquors by motorists, and in many communities, "a deplorable laxity in the enforcement of traffic laws."

Industrial safety, in the midst of puzzling economic re-adjustment must be carried on, he said, as never before, and safety men must adjust themselves to meet the demands of the hour and be prepared to adapt themselves to the requirements of tomorrow.

Preceding the president's address, Auxiliary Bishop James A. McFadden of the Cleveland Catholic Diocese gave the invocation. The Honorable Harry L. Davis, Mayor of Cleveland, delivered the address of welcome, and was followed by Herman R. Neff, president of the Cleveland Chamber of Commerce, who welcomed the delegates in behalf of the industrial and business interests of the City.

Donald B. Gillies, president of the Corrigan, McKinney Steel Co., Cleveland, pictured what safety work has accomplished since its inception, stating that accident fatality in the United States has decreased 31 per cent since the safety movement was organized.

The meeting closed with the unveiling of 108 Group trophies that were to be awarded at the Congress by the National Safety Council to the winning plants in seven of its industrial sections which conducted safety contests during the past year. These contests involved 715,000 people in 664 units working approximately 1,100 million man-hours.

Meetings of the Paper and Pulp Section

The Paper and Pulp Section program was an exceptionally fine one, covering four half-day periods and a luncheon. It opened on Monday afternoon, October 1, in the Tavern Room of the Statler Hotel, Chairman H. G. Gilson presiding, who began it with his address on The Section's Activities, Past Present and Future.

Tribute was given the Vice-Chairman in Charge of Membership, H. D. Banta, whose work brought to this Section the honor of having obtained more new and reinstated members than any other section of the National Safety Council. The secretary and *News Letter* editor, Frank L. Irvin was praised for consistently presenting varied and interesting material to the readers of the *News Letter*. The splendid work of the Program Committee and its chairman, Earl E. Grant, was mentioned, and acknowledgments given to George J. Adams, chairman of the Engineering Committee and to R. I. Dickinson of the Statistics Committee. Special thanks were offered to Ernest Augustus, who a year ago proposed a piece of work called the "Accident Experience Exchange," out of which, it was believed, could be gotten a knowledge of conditions and circumstances under which accidents are most likely to occur, and then did the job of tabulating the results and presented them later as a part of the program.

Past failure of the Section to avail itself of the knowledge and experience of the Health Committee, was partly improved upon this year under the chairmanship of Dr. L. H. Frechtling, who reported more than the usual amount of personal correspondence with mills on individual problems. Grateful acknowledgment was given to D. C. Hunter, chairman of the Poster Committee and to A. S. Dowd, chairman of The Paper Industry Annual Safety Contest, for the year's results.

Accident Prevention and the New Industrial Economy

It is recalled by those who heard Ernest W. Corn, now Field Safety Counselor, F.E.R.A., Washington, D. C., deliver his talk on The Irreducible Minimum before the annual meeting of the Paper and Pulp Section at Chicago in 1929, that the key-note then sounded continued to vibrate in the minds of his audience for a long time after. It was a matter of consequence, therefore, that the Section was prepared to enjoy to the fullest extent his forceful talk at this session on Accident Prevention and the New Industrial Economy.

He prefaced his talk by saying it was assumed he was addressing an audience of veterans in accident prevention methods.

What is going on underneath the great industrial structure of this country, he said, is the New Deal which is here whether we like it or not. We are in an era of industrial democracy, and no movement has done more to bring this about than the accident prevention route.

Safety properly conceived and expertly administered inevitably leads to effective human relations, said Mr. Corn. It furnishes a common ground of agreement. Plant safety is the first ground for contacts between the management and employees. Industrial Relations, so called, will most probably be supplanted by Human Relations, for the first is in terms of profit while the latter involves happiness and life. The "money motive" logically must pass, he said. Soon finance will be a service rather than a racket.

Conservation of human beings and materials have always been Safety objectives. We are pleading for longevity, he said, and wise management is seeking it more now than ever before. While we have always placed a premium on physical fitness, it is now further placed on to the maintenance of such. All want a consistent hour by hour production, efficient and profitable to man and plant, and the Safety Movement has done a great deal to bring this about—the recognition of mutual, social obligations and a program that squares with it.

"What then are the ideals of the new industrial economy?" asked Mr. Corn. First, an opportunity to every man for agreeable, socially useful, productive employment; second, a livelihood, comfortable and conducive to health and happiness, drawn as a legitimate sharing of the fruits of toil; and third, a reasonable, social and economic security.

"Where does the paper and pulp industry fit into this picture?" he asked. This is a large and reasonable progressive industry whose product is an important commodity. Remarkable industrial progress has been made by it in the last twelve years. Its mills being situated in small population centers, the industry has presented to it a definite social obligation.

If we properly meet the challenge before us, he said, we will recognize our sales obligation and aside from doing a good safety job, will lead employer and employee alike by the hand out of the twilight of confusion and uncertainty into the new day when, thanks to Safety, all will work together in reasonable unison for social and community values,

so inherently a part of modern industrial practice.

As might be expected, there were questions asked on phases of Mr. Corn's talk which the speaker either generously answered or adroitly avoided if considered too controversial. This concluded the session of the first day.

The Second Day's Sessions

The program of the second day's sessions, which began at 9:45 on Tuesday morning, was introduced with a forceful talk, such as the Section is accustomed to expect from its past chairman, Walter J. Brennan, safety engineer in the Maine Department of Labor, and former safety director of the St. Croix Paper Company. The subject chosen by the speaker was "Let's Teach Safety's Teachers," a discourse which gave a startling account of accidents that have happened in industry because "he or they didn't know." The talk followed very closely the text of his article which was published in the June, 1934 issue of *National Safety News*.

The accounts given were of actual cases, gleaned from the experience of mills where typical safety set-ups exist, but no specific technical instruction had been given to supervisors. Key men responsible for the safety of their crews did not have the requisite knowledge to forestall disaster. Perhaps the safety director was at fault in such instances, yet had he not covered the specific instance in each case, but had properly trained his lieutenants, they would surely have functioned, and safety would not have been violated.

Safety should be seen through the eyes of a foreman, said Mr. Brennan, and a program set up for the training of those who are expected to teach others. Safety meetings are the logical classrooms, and definite periods should be set aside for the development of specific phases of safety as adequate material. The subject should be taught by lecture or demonstration, using blackboards, asking questions, and issuing an abstract of the subject for future reference. Matters of general educational interest should be chosen, and the topical matter is not difficult to find. The supply is practically unlimited. The plant physician, chemist, mechanical and electrical engineers should be used as lecturers, and the wealth of information offered by speakers at the Annual Safety Congress, state and sectional meetings should be made available either by sending the foremen to these meetings or culling the programs to bring certain papers to the plant forum.

For teaching such phases as will interest certain groups only, the special or group meeting is held, where supervisors and their assistants are required to be present. Crews are thus frequently instructed. Formality should be dispensed with at such meetings and usually a few minutes is all that is required to cover a specific topic, answer questions, and adjourn. The well-trained representatives of machinery and supply houses are most always glad to "talk to the boys" at such meetings, and are certain to leave a lasting effect for betterment.

The use of posters and the distribution of all applicable forms of safety literature was strongly recommended. Each supervisor should accumulate his own safety library for reference and use in specific cases.

In conclusion, he said, "Why diminish the yield of fertile brain-soil by a poor job of sowing?" It was his belief that supervisors should be given elementary chemical and engineering training, and an appreciation of psychology with which to forestall the ever threatening disaster of an inadequate safety consciousness.

Comments and discussion followed Mr. Brennan's talk. In the course of it, L. J. Parant, vice-president and general manager of the St. Croix Paper Co., Woodland, Maine, related briefly of the comprehensive safety program that is being carried on by his company, and the benefits derived from it. Before this was inaugurated, the accident experience of the company was from eighty to a hundred and twenty lost-time accidents each year. In 1927, a definite safety educational campaign was put into work, and this rate became immediately and sharply reduced. The company has now just recently completed three years of operation without a lost-time accident.

Being situated in a small community, safety education is not only carried on at the mill, but has been put into the school with the aid of the National Safety Council school course. Thus, not only the employees of the mill are safety conscious but the entire community is interested. Every man, from the president of the company down to the janitor, is giving his whole-hearted co-operation to Safety.

The Accident Experience Exchange

A summary report of the Accident Experience Exchange and attempted study of paper mill accidents, was rendered by Ernest Augustus, safety director of The Mead Corporation, Chillicothe, Ohio, of which the following is the preamble:

Lack of available time and the necessary clerical help prevented the making of a more detailed study and analysis of the facts gathered on the 300 lost-time accident reports submitted in connection with this exchange, out of a total of 1,405 such mishaps reported in connection with the 1933-34 Paper Industry Annual Safety Contest.

The proportionately small number of cases reported during the year, when compared with the total number of accidents occurring in the industry as a whole during the same period of time, also made it seem unwise to draw any very definite conclusions from the facts furnished in connection with only three hundred of those cases. In other words, it was felt that the statistical data obtained from only 300 accident reports, submitted from only 46 separate mills, would not be truly representative of the industry as a whole, and in certain instances might prove to be greatly misleading.

One other difficulty was also encountered by those attempting to make this study, and that was that insufficient information was asked for on the forms or questionnaires used in reporting accidents. Numerous questions, the answers to which might very conceivably bear an important relation to the summaries of answers given to other questions actually asked, were omitted entirely from the report form. This being true, the summaries and partial conclusions given in the report are based only upon the actual facts furnished, without regard for other important factors having a possible close relationship to them, but which, unfortunately, are not now available. Perhaps, in future experience exchanges and studies, more of these important facts may be obtained,

Major trophy awarded by The Paper Industry

thus making it possible for those making the studies to draw more definite and accurate conclusions. If such should prove to be the case, then the time and effort which has been expended on this first attempt at making an intelligent and thorough analysis of the accidents occurring in our industry each year shall not have been entirely wasted.

Objection may be raised to the supplying of detailed information relating to every lost-time accident occurring in the paper industry of this country each year, but let us not forget that experience is still the greatest teacher of all, and unless we can obtain a clear-cut, accurate picture of the accident situation in our industry as a whole, based upon data compiled from detailed reports such as has just been mentioned, we shall never be able to act with the greatest degree of intelligence in helping to reduce the annual toll of life, limb and money, resulting from accidents occurring in our respective plants.

A detailed tabulation and analyzation of data relating to the 300 accidents reported is then given. Time lost as a result of these 300 accidents amounted to 32,674 days. Of this total time lost, 27,750 days was due to permanent partial and permanent total disability, or to fatalities, using the standard time-charges for such accidents, while only 4,924 days of the total was time actually lost. Including the standard time-charges, the average time lost by the 300 persons reported injured in connection with this study, amounted to 108.9 days per individual. Excluding the time-charges, this average is reduced to 17.7 days per individual.

Included with the 300 accidents covered by this study, were four fatalities, seven finger amputations and one loss of an eye.

Next followed tabulations and detailed studies of day-work and shift-work; married and single persons; male and female employees; months and days of the month on which accidents occurred; hours of the day and night; time worked preceding the accident; ages of the injured, and the years employed by the company; years employed on particular job where accident occurred, and accidents by departments in the mill.

Further breakdowns are shown of the jobs on which injured persons were employed at the time accidents occurred; the machines, tools and appliances connected with them; the nature of injuries sustained, and the parts of the body injured.

The last and probably most important tabulation made in connection with this study of three hundred accidents has to do with the answers given to the question "proximate cause of the accident." Here, however, the question was wrongly worded. According to the answers given, it should have been "cause of the injury." Actually, there is a vast difference between the cause of an injury and the cause of an accident, but unfortunately the two are frequently confused by numerous experienced safety men. What should actually be considered the proximate cause of the injury is frequently misinterpreted to be the cause of the accident, when such is not the case at all. The cause of an accident is usually something which can be remedied, while the cause of an injury is one of the resulting circumstances of the thing that caused the accident.

With this explanation, therefore, let it be understood that the table herewith shows only the tabulation by number of cases of the various causes of injury. This study, unfortunately, shows nothing whatsoever as to the remedial causes of the 300 accidents covered, or in other words shows nothing as to who or what was primarily responsible for the accidents.

The search for some relationship between the various causes of injury and other data tabulated in connection with this study was undertaken. Since falling material accidents were the most numerous, a check-back was made to find the relationship as applied to this particular cause.

These relationships are shown, and it is regretted that time was not found to make similar studies and comparisons between other types of accidents and related facts in an effort to get at the real root of the causes of accidents.

Analyzation of 300 Accidents in Paper and Pulp Mills Reported in Accident Experience Exchange

Types of Accidents or Causes of Injury		*No. Cases*	*Days Lost*
Falling or slipping material and objects		66	7,375*
Falls (from height 18, or level 29)		47	1,268
Hand tools (hooks, piles, wrenches, etc.)		28	377
Lifting, pulling, pushing, prying		27	199
Caught in revolving rolls		24	6,932*
Handling material and objects		19	410
Caught in gears, belts, etc		19	7,501*
Bumped by or run over by moving loads, objects, etc		10	52
Struck by flying objects		10	85
Caught by or jammed between objects		7	72
Splashing liquids		6	38
Stepping in holes or on objects		6	42
Miscellaneous		5	130
Striking and bumping against things		4	77
Burns and scalds—Acid, caustics, etc.	1	3	
Steam, hot water, etc.	3	1,854	
Hot pipes, objects	1	54	
Electric	2	6,003	
		7	7,914*
Bursting hose		3	31
Explosions and explosive actions		3	52
Foreign objects or substances in eyes		2	7
Extreme hot or cold weather		2	17
Fumes and gases		2	20
Loose clothing caught in machinery		2	65
Bursting grinding wheel		1	20
Totals		300	32,674

(*) Including standard time-charges.

Revised Form of Accident Study Report

From the number of cases reported in the last Accident Study, sufficient information and facts were obtained from which to draw certain conclusions, among which was the one that the study and exchange of accident experiences should be continued and enlarged upon.

With this purpose in mind, the standard report-form or questionnaire intended for use in reporting ALL accidents has been changed and enlarged upon. A total of fifty-two questions are listed. In all but four or five instances, these questions can be answered definitely and positively, either through the use of figures, or by the insertion of a few words.

Safety Methods Adopted by the Consolidated Paper Corporation

A comprehensive paper describing the safety methods adopted by the Consolidated Paper Corporation, Montreal, Canada, was presented by J. H. Turner, director of safety of the corporation's mills which are all located in the Province of Quebec; the Belgo Division, at Shawnigan Falls; the Laurentide Division, at Grand 'Mere; Port Alfred Division at Port Alfred, and the Wayagamack Division, at Three Rivers.

The present Safety First Service, so called, was inaugurated in June, 1930—except that at Laurentide the service had been installed some years earlier, following an era of high accident frequency. In succeeding years, a remarkable reduction in accidents took place, although in 1933, chiefly on account of the economic and social upheaval, there was an increase. However, with a nearer return to normalcy and stabilized working conditions, this discouraging phase is being overcome.

The magnitude of the problem of accident prevention not being properly realized at first and much less understood, it was only by courageous experiment and a constant readiness to learn from results that the company has been able

to make way in the solution. The real difficulty is that there is no one obvious way of avoiding industrial accidents that arise from a multitude of causes, but the immediate need is for positive safety measures, and this can only be best made effective by a combined effort to educate the man in the mill to the practice of common prudence; an effort which has been going on for years and still leaves room for improvement.

A description of the company's Safety First Service was then given in detail, of which the following is but a condensed account.

General supervision in all mills is under the supervision of the Director of Safety, who is directly responsible to the chairman of the Operating Committee. The Director of Safety systematically visits each mill to organize safety committees, inspect the plant from an accident prevention and sanitary standpoint, and suggest ways and means of correcting dangerous working conditions, etc. He conducts publicity campaigns and generally furthers the educational work in connection with accident prevention within the organization, carefully scrutinizes accident records, compiles comparative statistics of lost-time accidents each month, and deals with all correspondence with outside parties in connection with contests, request for statistics and all criticisms of the Safety First Service. While visiting individual mills, the closest co-operation between him, the Mill Manager, Safety Inspector and Mill Physician is maintained.

At each of the mills, a Safety Inspector, generally the Employment Supervisor, and an understudy have been appointed by the Mill Manager. The Safety Inspector, in all matters pertaining to the Safety First Service, reports to the Director of Safety. He arranges to devote time to the latter upon his periodic visits, when together they investigate, and so far as possible, reconstruct each lost time, potential lost-time and near accident, with the parties concerned, with the view of adopting prompt measures to prevent a recurrence. They make tours of plant inspection for the detection of hazardous conditions, malpractices and unsafe methods of operation. Individual accident folders are kept for each lost-time accident for filing of copies and all correspondence and forms pertaining to the case. Safety inspectors are held responsible for assembling and distributing all forms required by the company and the Workmen's Compensation Commission of Quebec.

The First Aid Nurse is responsible to the Medical Director, and is expected to co-operate with the Safety Inspector by reporting to him immediately all major accidents and minor injuries which in her opinion should be investigated.

In order that the Corporation has accurate and comparable statistics of mill accidents, a Monthly Accident Statistical Statement is compiled by the Director of Safety, from the monthly Statement of Accidents, furnished by Safety Inspectors. In compiling this statement, only lost-time accidents are considered, but for the purposes of Safety investigation, the Corporation recognizes five types of accidents, the definitions of which are as follows:

Classification of Accidents: *Class 1*—Accidents incurring loss of seven days or more; *Class 2*—Accidents incurring medical attention and/or loss of time of six days or less; *Class 3*—Accidents incurring no loss of time beyond the remainder of the shift or day on which the accident occurred and no medical attention other than First Aid provided by the First Aid Nurse; *Class 4*—Fatal accidents; *Class 5*—Near accidents. A "near accident" is one which irrespective of damage to property or equipment does not cause any traumatic injury to the employee concerned. Near accidents are in all cases investigated and the causes reported to the Mill Manager in order that such hazards can be eliminated.

In compiling his Monthly Statement of Accidents, the Safety Inspector divides his statement into two parts: the one part classifying all lost-time accidents according to cause of injury, covering those in the current month and any that have been carried over from the previous month; the second part is compiled accumulatively from the beginning of the current year to the end of the current month, and contains fourteen item headings calling for total number of mill accidents, classified under standard terms; days lost; daily average number of employees; total hours worked; frequency and severity rates; number of First Aid primary dressings, and the number of re-dressings; total lost-time wages, and National Safety Council data compiled in accordance with their formula. The utmost publicity is given to these statistics.

The formation, maintenance and functions of the Central Safety First Committee at each mill and their sub-committee is described in detail. Sanitation and lighting conditions in the mills have constant attention, and many improvements have been effected. In this connection within recent months, Cleanliness Committees consisting of from three to six superintendents have been appointed by the respective mill managers, who make a special inspection of the plant once each month, and report on conditions found with regard to safety, cleanliness and general conditions.

The fullest co-operation with the Medical Service is maintained, particularly in respect to educating employees to avail themselves of the First Aid Service. All employees meeting with a lost-time or minor accident requiring surgical attention, are interviewed and the causes leading up to their injury fully investigated. Further, in no case is an employee allowed to work who cannot give at the very least 95 per cent working efficiency at his regular job, or on a job at the same rate of pay as his regular job, and no job is created to otherwise take care of any injured employee.

A great deal of thought and attention has been given to the safeguarding of machinery and hazardous conditions, and now, with all known physical conditions adequately safeguarded, the company is chiefly concerned with the employee in directing his mental attitude away from thoughtless, careless and negligent methods of working. In this program, Safety First signs, posters and bulletins play an important part.

All accidents are classified as to physical locations, and in addition to tabulating the general contributory causes as either accidental, personal thoughtlessness, carelessness or negligence on the part of the injured or fellow workman, each case is analyzed with the object of determining what element of the human being entered into the cause. This analysis has been grouped under the following ten major headings, each of which has its sub-divisions: Faulty Supervision; Lack of Instruction; Faulty Mechanical Conditions; Poor Working Methods; Disregard of Instructions; Human Hazards; Physical or Mental Condition; Infection—Sole Cause of Disability; Avoidable causes, and Unclassified.

By determining the fundamental human cause, and taking each specific incident as an object lesson, ways and means can be evolved to teach employees how to prevent a recurrence.

The Paper and Pulp Luncheon

The Tavern Room of the Statler Hotel was nicely filled at the annual luncheon, where the trophies and awards were given to representatives of the mills that had been successful in the 1933-34 Annual Safety Contest, sponsored by the National Safety Council.

Copies of the Final Report and Ranking of all mill contestants, as of June 30, 1934, were distributed, and A. Scott Dowd, editorial director of THE PAPER INDUSTRY and chairman of the Contest Committee, was then called upon for the data of the Contest, which he gave as follows:

DATA ON THE 1933-34 SAFETY CONTEST

The experience of 105 mill members of the Paper and Pulp Section in the twelve-month Safety Contest ending June 30, 1934, is exhibited in the Final Report issued by The National Safety Council.

Summarizing the results and comparing them with the accomplishments of the past eight contests, some very interesting facts are revealed.

The total number of mill contestants and man-hours worked are a little *more* than in the year before, although the total number of employees is slightly *less*. The number of Disabling Injuries has jumped up to an increase in Frequency of 44 per cent over the previous year. Notwithstanding this immediate increase, however, the Frequency rate of 19.626 in the 1934 Contest is one point less than the average, 20.67, for the past eight years. There were more mills that had a Frequency Below Average than were shown since 1931, but the ratio of Employees to Accidents was the lowest since 1927.

FINAL REPORT—THE PAPER INDUSTRY ANNUAL SAFETY CONTEST OF MEMBERS, PAPER AND PULP SECTION, NATIONAL SAFETY COUNCIL

July 1, 1933, to June 30, 1934

Year	No. of Mills	Man-Hours Worked	Employees	Number of Disabling Injuries	Days Lost	Rate		Mills with Freq. below Aver.	Mills with Sev. below Aver.	Ratio		Days Lost per Injury	Mills with Perfect Records
						Aver. Freq.	Aver. Sev.			Empl. to Acc.	Non-Fatals to Fatals		
1933-1934	105	71,436,322	34,132	1,402	102,099	19.626	1.429	56	80	24 to 1	141 to 1	73	6
1932-1933	98	60,772,518	34,709	829	101,169	13.641	1.665	53	71	42 to 1	83 to 1	122	11
1931-1932	131	74,569,954	32,454	1,044	40,211	14.000	.539	55	69	33 to 1	60 to 1	39	9
†1931	125	48,715,543	39,796	787	17,263	15.744	.354	72	76	52 to 1	192 to 1	23	15
†1930	124	47,343,549	36,153	986	22,504	20.826	.475	55	66	37 to 1	163 to 1	23	11
†1929	123	49,776,515	36,916	1,311	25,073	26.337	.504	59	80	27 to 1	187 to 1	19	6
†1928	122	47,673,816	36,357	1,355	26,368	28.422	.553	64	76	27 to 1	150 to 1	19	8
†1927	119	43,802,804	33,786	1,468	28,396	33.514	.649	61	75	23 to 1	147 to 1	19	6

†Contest period January 1 to June 30.

Note: In all contests prior to 1932-33, the Standard Scale of Time Charges was not used for deaths, permanent total disabilities and permanent partial disabilities. Only one-sixth (1/6) of the scale charge for specific injuries was used. On July 1, 1932, the Standard Scale was adopted. This explains why the 1932-33 and 1933-34 severity rate is considerably higher than for other years.

September, 1934

A comparison of Severity Rates over more than the last two years is difficult to compute owing to the fact that in contests prior to 1932-1933, the Standard Scale of Time Charges was not used. The average Severity Rate in the 1934 Contest was 1.429 compared to 1.665 in the 1933 Contest. The ratio of Non-Fatals to Fatals was 141:1, being the best record that has been made since 1931.

There were fewer mills that finished the Contest with Perfect Records than has been seen since 1929.

Looking into the records of each Group in the 1934 Contest and comparing them with the figures of 1933, we are able to get a relative picture of Safety progress in the large and small mills.

Group A, for example, has not had a Perfect Score since the one made by the Niagara Falls Mill of Kimberly-Clark Corporation, in the six months contest in 1929. The Average Frequency Rate of Group A in 1934 was 20.67, which was the equivalent of the average contest rate for the past eight years, but largely in excess of the rate 13.01 made by this group the year before. The Severity Rate of 1.43 made last year was slightly better than the 1.85 made in 1933.

Group B mills made an average Frequency Rate last year of 16.09 compared with 12.85 the year before; and a Severity Rate of 1.4 compared with 1.73 the year before. This Group has had six perfect scores in the last seven contests. St. Croix Paper Company made three of them; the other three were made by Finch, Pruyn Co., The Crystal Tissue Co. and Champion Coated Paper Co. (Mill No. 1).

Group C made a higher average in *both* Frequency and Severity, or 22.9 and 1.9, respectively, in the past year compared with 17.8 and 1.51 the year before. There were no perfect scores in this group the past year, which is very unusual. In 1933, there were two perfect scores; in 1932 there were two; in 1931, there were three; and in 1930 and previous years there were large numbers of perfect scores, but these are not comparable, as in those years, the smallest mills were included in this Group. Notable records of perfect scores made in this Group were those of Cornell Wood Products Co. in the 1931, 1932 and 1933 Contests; the Appleton, Wis., Division of Consolidated Water Power and Paper Corp. in the 1931 and 1933 Contests; the Pioneer Paper Co., Los Angeles, in 1932; and Finch, Pruyn Co. in 1931.

Group D, likewise, made a higher average in *both* Frequency and Severity, or 20.04 and 1.52, respectively, in the past year compared with 17.29 and 1.33 the year before. Perfect scores in this Group were less than usual. The most notable example of a continuous perfect record in this Group is that of the Riley mill of the International Paper Company, which has been so operating since March 17, 1926. The Madison, Maine, mill of Hollingsworth & Whitney Company made perfect scores last year and in 1931.

The record made the past year by the Re-manufacturing Group, Division II, showed a marked jump in Frequency—from 8.3 in 1933 to 14.57 the past year. On the other hand, Severity showed a big improvement or a drop from 1.42 in 1933 to .214 in the past year. There were two perfect scores this year and last, the Natick, Mass., plant of the Container Corporation of America being represented as such in both Contests. In 1932, there were three perfect scores in this Group, and in 1931, there were four.

A comparison of Division I as a whole last year with the year before is as follows:

	Frequency	*Severity*
1933 Contest	14.32	1.69
1934 Contest	20.04	1.52

Division II is as follows:

	Frequency	*Severity*
1933 Contest	8.3	1.42
1934 Contest	14.57	.21

In the present contest, 1934-1935, there are 128 registered to date. A number of changes in the rules have been made toward the standardization of all the Sectional Contests in the National Safety Council. Automatic re-entry of units is provided in Rule 2; elimination of Severity in points—Frequency only to govern—is provided in Rule 7; equal awards and rankings are provided for all perfect records (Rule 8); hernia and heat prostration as disabling injuries are defined in Rules 11 and 12. It is believed that these changes will make for more simple, satisfactory and spirited competition.

National Safety Council Trophies Awarded

C. B. Auel, manager of the Employees' Service Department, Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa., and past president of the National Safety Council, was congratulatory in his remarks preceding the presentation of the National Safety Council trophies and certificates to the Group winners in the Contest. He praised the Paper and Pulp Section highly for its record as a pioneer in safety contests among industrial plants, and for its own splendid achievement in accident prevention. Mr. Auel then presented beautiful bronze placques to the mills ranking No. 1 in each group. All perfect scores were given First Rank, and they consequently received bronze trophies. While this was in excess of what the rules provided, the Council decided to make equal awards to all perfect scores. Certificates were given to the mills ranking Second and Third, providing there were not more than two or three perfect scores in each respective group. Following is a list of the mills that received the Group awards:

DIVISION I

Group A

Rank 1 (Trophy)—International Paper Co. (Hudson River Mill), Palmer, New York.

Rank 2 (Certificate)—International Paper Co. (Otis Mill), Chisholm, Maine.

Rank 3 (Certificate) — Anglo-Newfoundland Dev. Co., Ltd., Grand Falls, Nfd.

Group B

Rank 1 Perfect Score (Trophy)—St. Croix Paper Co., Woodland, Maine.

Rank 2 (Certificate)—International Paper Co. (Niagara Falls Mill), Niagara Falls, N. Y.

Rank 3 (Certificate)—Cornell Wood Products Co., Cornell, Wis.

Group C

Rank 1 (Trophy)—Bryant Paper Co., Kalamazoo, Mich.

Rank 2 (Certificate)—Consolidated Water Power & Paper Co. (Biron Mill), Wisconsin Rapids, Wis.

Rank 3 (Certificate)—Strathmore Paper Co., West Springfield, Mass.

Group D

Rank 1 Perfect Score (Trophy)—Bird & Son, Inc., Chicago, Ill.

Rank 1 Perfect Score (Trophy)—International Paper Co. (Riley Mill), Riley, Maine.

Rank 1 Perfect Score (Trophy)—Hollingsworth & Whitney Co. (Abenaquis Mill), Madison, Maine.

DIVISION II

Rank 1 Perfect Score (Trophy)—Container Corp. of America, Natick, Mass.

Rank 1 Perfect Score (Trophy)—Southern Container Co., Houston, Texas.

Rank 3 (Certificate) — Individual Drinking Cup Co., Easton, Pa.

The Paper Industry Trophy

It was deeply regretted that circumstances had prevented the attendance of Edward B. Fritz, publisher of THE PAPER INDUSTRY, who was to have personally awarded his major trophy to the mill that had made the most outstanding record of the Contest. Mr. Fritz attended the opening of the first day's session and had to leave shortly after. By his request, Mr. Dowd awarded the major trophy to the St. Croix Paper Company, Woodland, Maine, which had been unanimously selected by the judges as the winner.

The St. Croix Paper Company has now in its possession three major trophies, won in the years 1928, 1933 and 1934, as well as a number of the N. S. C. group awards. It is the present holder of the paper and pulp industry safety man-hour record, which passed the mark of three years without an accident September 22, 1934, involving more than two and one-quarter million safe man-hours.

Trophy Accepted by Mr. Parant

In a few well chosen words of appreciation, L. J. Parant, vice-president and general manager of the St. Croix Paper Company, accepted the trophy and called on F. L. Irwin, employment supervisor of the company, to assist him in bearing the trophy back to the mill employees who had so well exemplified their safety slogan, "All for Safety—Safety for All."

Resolution Read by Mr. Parant

Earlier in the day, a resolution was offered to the Chair by Mr. Parant, and unanimously carried, which read as follows:

Resolved that through the generosity of Mr. Edward B. Fritz, publisher of THE PAPER INDUSTRY Magazine, it has been made possible to inaugurate and carry on through the Paper and Pulp Section of the National Safety Council an annual Accident Prevention Contest within this industry, and

Whereas the effect of this Contest has been far reaching in its beneficial results and has aided materially in stimulating the industry to greater safety effort,

Therefore be it resolved that the Paper and Pulp Section of the National Safety Council assembled at the Twenty-third Annual Safety Congress of the National Safety Council at Cleveland, Ohio, on October 2, 1934, does

Hereby express its keenest appreciation to Mr. Fritz for his aid in making this Contest possible. Be it further resolved that a copy of this Resolution be made a part of the minutes of this Session and a copy sent to Mr. Fritz.

Election of Officers

The following officers were elected for the ensuing year:

Chairman—H. D. Banta, Hoberg Paper & Fibre Co., Green Bay, Wis.

Vice-Chairman in Charge of Membership—E. E. Grant, Crystal Tissue Co., Middletown, Ohio.

Secretary and Chairman of Program Committee—F. L. Irwin, St. Croix Paper Co., Woodland, Me.

Editor of News Letter—T. L. Christensen — Continental Paper & Bag Corp., Marinette, Wis.

Chairman of Engineering Committee—J. H. Turner, Consolidated Paper Corporation, Montreal, Canada.

Chairman of Statistics Committee—A. E. Winslow, Hollingsworth & Whitney Co., Waterville, Me.

Chairman of Poster Committee—J. J. Hastings, Port Huron Sulphite & Paper Co., Port Huron, Mich.

Chairman of Contest Committee—A. S. Dowd, The Paper Industry, Chicago, Ill.

Chairman of Health Committee—Dr. E. W. Paine, Hollingsworth & Whitney Co., Waterville, Me.

Members at Large—H. G. Gilson; J. J. Pisak, Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis.; G. J. Adams, International Paper Co., New York City; K. L. Faist, Champion Coated Paper Co., Hamilton, Ohio, and W. J. Peacock, Northern Paper Mills, Green Bay, Wis.

Third Day's Session

The morning of October 3 was given over to a Safety Exchange and Round Table conference, or an open forum on paper and pulp mill safety problems, lead by H. T. Randall, works engineer, The Champion Coated Paper Co., Hamilton, Ohio, and past president of the American Paper and Pulp Mill Superintendents Association.

Mr. Randall asked if there has been any recent experience of accidents in the operation of guillotine cutters, or so-called paper trimmers, and what existing safeguards there are for preventing them on such machines.

G. J. Adams, International Paper Co., mentioned an electric, two-button control thrustor, made by a well known manufacturer. It requires the use of both hands of the operator, thereby keeping them away from the knife. It was brought out by others that a helper should not be allowed to touch the machine in the cutting and trimming operation.

W. A. Gleason, Hammermill Paper Co., cited the report of a committee appointed to make a study of Dual Control on Guillotine Cutters, which was presented at the 1932 Safety Congress, and is reported in the proceedings of that year. The report recommended that the members of the Paper and Pulp Section go on record that manufacturers of guillotine cutters should be urged to install positive dual control on all such machines sold after January 1, 1933.

H. G. Gilson asked for a discussion of practice in cleaning pits under the paper machine dryer, stating that this question had been brought up by a tissue mill representative.

H. D. Banta, Hoberg Paper & Fibre Co., cited a fatality that happened as the result of falling onto a felt roll in a three-foot clearance under the machine. Since then, the rule is to never go into the pit while the machine is in operation. General cleaning is done on a Sunday. If there is immediate need to enter the pit, the dry end of the machine must be shut down.

Another spoke of the practice of shutting down the dry end and locking the starting box before entering the pit. Another remarked that a basement in his mill permitted the pit to be removed, which improved the circulation of air, and the paper was dried with less steam.

Fires in switch boxes were said to be the cause of many accidents, and the question was asked as to the safest method of extinguishing them. One replied that the use of a 2½-inch fire hose, not less than 20 feet away from a 2300-volt switch, to avoid shock, is the safest method. It was also reminded that asbestos insulation on electric cable is a conductor when wet.

"What is being done to enforce the use of goggles?" was asked by the representative of a newsprint mill.

G. J. Adams, International Paper Co., said that no standard design of goggles should be commonly used; the type adopted should be the one that fits the condition. Another stated that in his mill, the spectacle goggle with safety glass was most commonly used, but a prescription in each case was made by a regular optician in the plant.

E. E. Grant, Crystal Tissue Co., mentioned having shown the film on the use of goggles which the National Safety Council has for the use of its members. Mr. Grant also made mention of a talk on silicosis that he had heard recently, in which it was said that the danger of this attends the cleaning of steam boil-

ers. He recommended that this be investigated.

The Fourth Day's Session

The final session of the Section began at 9:45 o'clock on Thursday morning in the Tavern Room of the Statler Hotel. A large gathering of visitors from other sections attended the meeting to hear two splendid papers that were on the program. The first paper presented was the "Trend of Occupational Diseases and Compensation in the Paper Industry" by Dr. A. G. Cranch, medical director, National Carbon Co., Cleveland, a splendid, informative treatise.

Space does not permit the presentation of Dr. Cranch's paper in its entirety, and the following is an abridgement of the subject matter.

Trend of Occupational Diseases and Compensation

The compensation system for industrial disabilities, known as "Workmen's Compensation Insurance," is the result of an effort to correct the conditions which had developed with the growth of the machine age. As machines became more common, and mass production with its speeding-up appeared, accidents became more frequent and severe. The injured worker was felt less as a personal problem to the employer, and was too readily forgotten. He was left more dependent upon his own resources and such care as friends could give him. Should he attempt to obtain redress from his employer through process of law, he was met with three basic and almost insurmountable defenses available against him: First, the "act of a fellow servant"; second, the "assumption of risk" by an employee, and third, the question of "contributory negligence" on his own part.

Slowly, the three great defenses of the common law were broken down, and it became increasingly possible for workers to obtain judgments against their employers on the basis of injuries received. This promptly led to liability insurance for employers. As judgments obtained by workers became more numerous, premiums charged by the liability companies became larger. These premiums amounted to enormous sums compared to the amounts actually paid to the injured, and a large proportion of the injured received nothing at all. Governmental aid was then enlisted and the Workmen's Compensation scheme evolved.

The primary purpose of the first compensation laws in this country was to provide cash payments, but earlier European laws usually included some form of medical care, as well as cash benefits for disability. So when the first such laws were drawn in this country, such provisions were included. Such legislation is primarily a state function, and as a result, there were as many opportunities to experiment with forms as there were states and federal jurisdiction. The result was a great number of state Workmen's Compensation laws, all having a general similarity but differing widely in important details of coverage, payments, medical care, etc. The first of these laws was passed by the United States Government for federal employees in 1908. The first states to pass such laws were some half dozen in 1911, Wisconsin's being the first to become effective in August of that year. Other states steadily followed, but even now there are four states which as yet have no such law.

The trend ever since these laws came into effect has been toward increased liberality. Cash benefits have been increased for temporary and permanent disabilities, and for death claims; waiting periods have been reduced; periods during which medical care is given, and amounts available therefor, have been increased; coverage has been increased, and in twelve states occupational diseases, as well as accidental injuries, have been made compensable in one way or another.

In prosperous times, it was possible to carry on with these liberal interpretations. With the depression, the picture changed. Reduced employment brought reduced collections, reserve funds became "frozen," and banking conditions played havoc with such funds as were supposedly entirely available. There is today a flood of "not allowed" claims, because baseless, but all must be investigated at greatly increasing expense. Appeals from adverse decisions are more frequent, and in states where appeal to a court can be made, juries are making awards in many cases on what seems insufficient grounds. The result of these trends has greatly increased the cost of insurance, and in some cases actual threatening of the financial stability of the insurers.

Present trends in compensation may be summed up as follows: *In claims*—far more groundless and border line claims are being filed, apparently in an effort to stretch the coverage of these laws to include what might belong to health or unemployment insurance laws. *In administration*—an increasing tendency to make use of legal services in presenting claims; more appeals; more complication in procedure and delay in payments; a marked tendency to interpret the law more strictly. *In scope*—a steadily growing tendency to include coverage for occupational diseases as well as accidental injuries.

Along with the definite trend toward inclusion of occupational disease, has always been some argument as to scope and method of coverage. Theoretically, just as any accidental injury arising out of and in the course of employment is compensable, so should any disease. This idea is reflected in the legislation where the act applies to "injury" and may so include any disease as well as accident. This is the so-called "blanket coverage." The other method is to adopt a schedule of diseases recognized as occupational, making them compensable but excluding others. This limited coverage is known as the "schedule method." There are valid arguments for and against each method.

To sum up the trend in the field of compensation for occupational disease, it seems there is a definite increase in recognition of the justice of such coverage; that haphazard methods of approach are giving way to intelligent study of the problem; that such study seems to show clearly the value of a schedule method rather than a blanket coverage, and that there is increasing recognition that a different setup is required for efficient administration with provision for adequate medical advice in handling claims.

Future trends are noticeable—one toward broader coverage, the other toward a return to methods of administration involving more legal aid and the courts. The first might lead to inclusion under a compensation law of much that should not be covered in such laws. The second seems likely to defeat two of the important features of the law, namely, to make it possible for an injured workman to obtain payment for his disability without the added expense of legal aid, or the technicalities of court procedure.

In closing, there were listed seven objectives for consideration in the making of further amendments to the compensation law.

Putting Safety Engineers Under the Microscope

A. Graham Cole, director of safety, Metropolitan Life Insurance Co., gave the closing address of the meeting in a paper entitled "Putting Safety Engineers Under the Microscope."

The speaker reviewed comprehensively the accident prevention movement covering the past ten years. Special consideration was given to discussing the small plant of fifty to one hundred and fifty employees, with a view of showing why the small plant is in need of organized safety work. Of perhaps first importance is the fact that in the small plant, where accidents, particularly serious accidents, happen so infrequently as not to impress the management with the seriousness of the problem, yet these infrequent occurrences produce a frequency and severity record which may be very high, and may seriously affect the insurance premium.

In the past, accident prevention was considered very largely as a humane responsibility, he said, and accidents were considered usually as those incidents which resulted in human suffering. Recent studies have indicated, however, that industrial accidents also result in the destruction of property, the damage of machinery, the spoilage of raw and finished product, and the loss of valuable and trained workers. In many instances, these conditions result where no personal injury is experienced. The prevention of all types of accidents would thus serve to decrease many forms of waste, and in a number of instances will mean the difference between loss and profit on the annual balance sheet.

The safety engineer who will, therefore, capitalize upon his present opportunities, is the one who will take active steps to analyze the reasons executives have not been sold on the advantages of safety programs.

If it is granted that accidents are a form of economic waste and that the prevention of accidents is an economic necessity, it can be assumed that the entire responsibility for the safety program is one that naturally rests on the chief operating executive, and further, that the safety program should not be considered purely as a welfare activity but as a phase of industrial management and supervision.

With this conception, the safety engineer becomes not an independent force attempting to instill safety consciousness and prevent accidents through his own ability. He becomes an assistant to the operating head of the business.

The departmental supervisor requires the co-operation of the men who are working for him. To accomplish this, it is necessary that he impress his workers, both by example and conversation, with his sincere interest, and encourage them to aid him in the conduct of plant activities, unmarred by either personal injury or non-personal injury accidents.

The appointment of certain employees on safety committees will undoubtedly aid the supervisor in meeting his responsibility, if the committee is organized with this purpose in mind.

Summarizing the topic, Mr. Cole emphasized the fact that the safety engineer has, at the present moment, perhaps the best opportunity he has ever had to analyze the defects in past procedure, and to develop himself as an integral part of the operating procedure of his industry, and as a real assistant to the chief operating executive.

Expressions of Appreciation

Following some discussion of Mr. Cole's paper, H. D. Banta, newly elected chairman of the Section for the coming year, expressed his appreciation of the honor conferred on him, and he praised very highly the work of the outgoing chairman and his accomplishments of the past year.

Previously, Past Chairman Gilson had advised the meeting that he was leaving his present connection. The Section went on record with a formal resolution, unanimously carried, expressing their highest appreciation of the valuable services Mr. Gilson had rendered it, of his lovable personality, and their sincere wish that his future connection will be happy and prosperous, and one which they hope will keep him identified with the Paper and Pulp Section. This concluded the meeting.

Exhibits Shown in Safety Town

Exhibits at the Twenty-third Annual Safety Congress were located in Safety Town, a sub-division on the mezzanine floor of the Statler Hotel. The trail in Safety Town went up Careful Drive and Prevention Avenue, down Humanitarian Street, past Precaution Avenue and ended at First Aid Boulevard.

The very latest safety devices, clothing, materials and systems were exhibited along the streets of this fairy town, proving that manufacturers of safety equipment are steadily progressing in their part of the safety movement.

◆ Cole Stickle

Cole Stickle, president and general manager of the Stickle Steam Specialties Company, passed away at his home in Indianapolis after an illness of several years. He was 77 years of age.

Mr. Stickle was born in Shaftsbury, Vermont, where he attended the public schools. Later he attended the Manchester Seminary at Manchester, Vermont.

In 1905, Mr. Stickle invented the Open Coil Heater and Purifier and went to Indianapolis where he founded the Stickle Company. Since that time he has been granted numerous patents. Perhaps those which stand out in the paper industry are the Stickle Thermic Vacuum Traps, Stickle Automatic Steam Control, Stickle Differential Drainage System, and the Stickle Blast Coil Economizer.

Surviving Mr. Stickle are his widow and son John B. Stickle. Since the illness of his father, John B. Stickle has managed the business and will continue the business as in the past.

◆ LINK-BELT COMPANY, Chicago, announces that it has purchased the entire equipment and stock of the Cresson-Morris Co., Philadelphia, and has added Philadelphia as a point of shipment of Link-Belt machine-molded gearing.

◆ Southern Alkali Operates New Plant

The Southern Alkali Corporation has begun operation of its new $7,000,000 plant at Corpus Christi, Texas.

This culminates a three-year building program and makes the Southern Alkali Corporation, jointly owned by the Pittsburgh Plate Glass Company and the American Cyanamid Company, the pioneer producers of alkali in the far South.

Ideally located on tide water with raw materials and fuel close at hand, this plant will be one of the country's important producers of alkalis.

◆ AMERICAN COATING MILLS, INC., announces the removal of its office to 22 East 40th Street, New York.

◆ ROBERT F. HUNTLEY, Oswego Falls Corp., Fulton, New York, has been accepted as an Approved Mill Pulp Testing Chemist, by the Joint Committee on Approved Pulp Testing Chemists for the Paper Industry and is listed as such, effective September 8, 1934.

◆ Appeal to Decide Validity of Seaborne Patent

Manufacture of designed papers employing the Seaborne invention is at issue in an appeal promptly to be filed by the attorneys for American Lakes Paper Company from the decision of Judge Stone in the Western District of Wisconsin.

Judge Stone's recently announced finding for the defendants, Nekoosa-Edwards Paper Company and the B. F. Goodrich Rubber Company, involved the validity of the Seaborne patent.

◆ New Catalogues and Publications

American Instrument Co., Inc., Washington, D. C.—Instruments for the Paper Testing Laboratory is the title of this company's bulletin No. 500. The instruments listed and described are: The Wet Rub Tester, the Carson Curl Sizing Tester, Calibrator for Folding Testers, and Dry Indicator Test, for sizing and water resistance.

Bausch & Lomb Optical Co., Rochester, N. Y.—"Research Microscopes and Accessory Equipment" is the subject of Catalog D-129 recently issued by this company. Illustrations and descriptive matter on the various types of research microscopes are included, as well as price list and specifications. The company has also prepared as an answer to many inquiries, suggested plans for two photomicrographic dark rooms. One of these plans calls for the smallest usable space 6 ft. by 6 ft., for which any small room, closet, or even the corner of a room may serve the purpose. The other plan is for a dark room 9 ft. by 12 ft. The plans are printed on one side of a heavy cardboard poster, on the reverse side of which the rules for using the dark room are printed. Copies on request.

Improved Paper Machinery Corp., Nashua, N. H.—A special bulletin on Impco Vacuum Filters has been received. There is a general description of the Filter and an explanation of its construction features, method of operation, and economic advantages. There are a number of halftone illustrations in color.

New Jersey Zinc Co., New York, N. Y.—A new booklet entitled Zinc Pigments for Opacity in Paper is just off the press. The pages of this booklet are of 70 lb. coated stock and comparison is made by having some of these pages marked as having had a Zinc Pigment in the coating formula which greatly improved the color and increased the opacity. The booklet is punched to fit a standard sized notebook.

Norma Hoffman Bearings Corp., Stamford, Conn.—This company has issued a new engineering catalogue which supersedes previous issues. This catalogue of 75 pages and cover is filled with valuable data that has a bearing on the company's line.

Philadelphia Gear Works, Philadelphia, Pa.—A new gear catalogue has been published by this company. There are specification tables and lists of stock sizes of gears which can be shipped immediately. The catalogue is well illustrated.

Smoot Engineering Corp., 2240 Diversey Pkwy., Chicago—This company, which is a division of Republic Flow Meters Co., has just issued a new catalogue describing the application, principle of operation and construction of Smoot regulators. The catalogue is well prepared, contains a number of specification table and descriptive matter on the various types of regulators which are all illustrated both with full halftones and cross-section views.

BOOKS

T.A.P.P.I. Program—For the 1934 International Convention of T.A.P.P.I. recently held at the Hotel Multnomah, Portland, Oregon, programs were prepared in book form which deserve special mention. These books are regular magazine size, 9x12, contain 111 pages, and are nicely printed on coated paper. In addition to the program of the meeting and auxiliary information, the book contains a descriptive writeup of practically every pulp and paper mill on the Pacific Coast with fine illustrations of the plants. There are yet a few copies of these programs available, and those desiring copies should address their requests to Walter S. Hodges, Sec., 2860 N. W. Front Ave., Portland, Ore., enclosing 15 cents to cover cost of postage.

POWER

GENERATION + UTILIZATION + MAINTENANCE

This section turns the searchlight on power and its allied problems, showing big possibilities to save. Opportunities to improve conditions, methods, apparatus will be discovered. Worth while practices suggest new ideas and wider usages of equipment.

By W. S. JOULE

◆ Avoid Open Flame

When inspecting a boiler after it has been laid up, special care should be taken not to use a naked flame, as there is always a possibility of an explosive mixture existing within the furnace—particularly where oil or gas has been the fuel. In using a portable electric lamp, remember also that the boiler metal and damp ash, etc., make a low-resistance "ground" so that electric shock may prove extremely severe, often proving fatal. The portable electric cord is always a hazard around the boiler room and similar places.

◆ Air Control for Oil Burning Boilers

Less draft is required to burn oil than to burn coal. The stack damper becomes increasingly important, therefore, as the means of minimizing the excess air, in a plant that has changed over from coal to oil. Keeping the stack or breeching damper closed as much as possible without curtailing the combustion rate not only reduces the excess air due to suction, but also affords more time for the transfer of heat from gases to boiler contents. However, the damper should not be closed so much that gases will not escape should the burners snuff out, or a serious explosion may take place.

◆ Inspection of Hydraulic Turbines

Runners should be inspected to see that there are no blocks of wood lodged in between the vanes and that the vanes are not cracked or corroded excessively. Corrosion is usually observed on the backs of the runner vanes where voids are formed at part-gate opening. Grease plugs are provided on some turbines so that grease can be inserted by hand or with a grease gun to lubricate the gate machinery. All of the wicket gates should be inspected to see that they open and close properly and that there is no excessive wear in the links or gate-shaft connections. Such wear may prevent the gates from opening wide, cutting down the waterwheel output, or from closing tight so that it is difficult to stop the unit. Besides, water is wasted during shutdown.

The lignum-vitae used for submerged turbine bearings should be examined to see that it is not rough and that the shaft is not cut or worn. The bearings should also be set in their proper positions so that they will carry their proportionate parts of the weight of a horizontal shaft, and in case the shaft is vertical they should be set so that they hold the shaft in proper alignment.

Erecting engineers use levels or similar instruments to align shafts, but it is exceedingly difficult to obtain an accurate level reading on a corroded or pitted shaft that has been in service a year or more. This difficulty may be overcome by inserting a thickness gage at different points around the circumference of the runner at the stationary speed ring (also called running joint) where there may be clearances of about $\frac{1}{32}$ in. (0.8 mm.).

These points can be reached when the wicket gates are wide open. Provided the speed ring is not worn, it will serve as a guide to determine the shaft alignment. When adjusting the jackscrews care must be exercised to draw all screws on each side of the bearing to the same tension, otherwise the lignum-vitae block will not line up with the shaft and will wear rapidly.

Double-runner horizontal units often have a center bearing inside the draft chamber accessible through a sealed manhole. This bearing can be adjusted to carry its proportional part of the weight after the end bearings are set correctly.

It is of the utmost importance to prevent the runner, speed ring or seal rings from wearing (owing to the shaft being out of alignment) because leakage of water will ensue, cutting down the efficiency, causing end thrusts and possibly bearing troubles. When seal rings are worn they can be replaced with some degree of convenience; however, large runner or speed rings are very expensive to replace. While inside the turbine it may be a good idea to look over the grease pipes which convey grease to the bearings and also to clean the screens where water is taken for gages, water-cooled bearings, etc.

Where ring-oiled babbitt bearings are employed for horizontal shafts access thereto is usually provided by some sort of steel or concrete inspection tunnels. Since the satisfactory performance of a vertical turbine depends upon the degree of generator-bearing perfection, ample attention should be given these parts.

It is often inconvenient to shut the water off from a turbine to repack packing glands on the main shaft, gate shaft or individual wicket-gate shafts, so it should be done while the turbine receives its regular inspection.

As the shaft is usually damp just outside the packing gland, it corrodes there. For this reason it is advisable to keep the gland as full as possible, because where the packing bears on the shaft it is kept clean. However, if a shaft runs a few months with the stuffing gland drawn up nearly tight and then is repacked, the rough shaft may ruin the new packing unless the rust is polished off.

While most glands are packed to withstand water pressure, some have to prevent air from leaking into the draft chamber. To assure a good vacuum seal water is discharged into a gland through a pipe connected to the penstock. These glands can be packed without shutting the water off from the penstock. Just enough water to keep the packing moist should be allowed to seep through a packing gland. The vicinity of a gland is often an eyesore because the dripping water is not handled properly. Some funnels and piping made to meet the individual requirements are advisable to improve the appearance.

◆ Clean Stoker Drives

Stoker gears should be protected from dust and should be cleaned and lubricated regularly. Wear can be materially reduced by keeping all accessible bearing and sliding surfaces well greased even where no special provision is made for lubrication. The stoker engine (or turbine or motor) and the drive should be protected from dust as fully as possible and be kept well lubricated.

◆ Tachometers in the Power Plant

Tachometers are useful in the boiler room and the turbine room. These consist either of the direct-current magneto and voltmeter type or the vibrating-reed type. The former of these is well adapted for indicating the speed of stokers giving the fireman, in conjunction with the draft gage, information which is of valuable assistance. The dial of this instrument may be calibrated in terms of the speed of the stoker, pounds of coal per hour, or in draft pressure required to burn the coal which is being fed.

The vibrating-reed type of speed indicator is a convenient device which will indicate the speed of a turbine or other high-speed machine by means of mechanical vibration when bolted to the machine. It may also be used as a remote instrument and its range may be extended for low speeds, in which case it is connected electrically to a special form of inductor-type alternator with split rotor which can be clamped around the shaft of the machine to be measured.

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A Simple Purchasing System

By Fred E. Kunkel

A PURCHASING system which is simplicity itself and requires a minimum of effort, without any clerical labor whatsoever, and very little expense in upkeep outside of printed forms, is used by the District of Columbia Paper Manufacturing Company in Washington, D. C.

The whole scheme of purchasing is put into operation when the head of any department in the business pencils a purchasing requisition or memo of his needs, which goes to the office of the plant superintendent. These requisitions are made out by the different department heads in long hand and are sent upstairs at any time of the day as a need arises.

The plant superintendent goes over them once a day and decides what to buy. An inventory is also taken each week in all departments as a check-up and insurance against running short on any needed supplies and materials.

"I look over all requisitions and use my own judgment as to what ought to be bought and how much," explained L. D. Nicolson, the superintendent. "We generally order a two months supply at a time and this has worked out very satisfactorily.

"Simply by glancing at the inventories at the end of each week I can tell what should be ordered in any particular dyes, felts, wires, etc. We carry more dyes than most mills because we are a specialty mill.

"Assembling the requisitions daily I make out a purchase order in long hand (using a duplicating commercial register), the original of which is mailed in an open face envelope, which saves extra work in readdressing an envelope. The purchasing copy is kept here in my office and a third copy goes to the auditing department.

"Then when the material is received the Receiving Department sends me a slip, the bill of lading or truck receipt, which must show the order number, and I check it with the purchase order and okey the bill for payment.

"A file of these purchase orders is kept in a loose leaf binder book chronologically. I have two files, complete and incomplete, so I can check up on all orders not completely filled. When the orders have been filled they are filed away for permanent record by years.

"Thus I can keep in touch with everything that is ordered and I know what materials have been ordered and when. *We used to have a very complicated system* involving a lot of detail and clerical expense, and kept a lot of useless records which we found could easily be dispensed with during the depression. And I don't know that we shall ever go back to it or abandon the present system which involves no clerical expense of any kind.

"The whole thing is a long-hand transaction, and each department keeps a copy of its purchase requisitions so that at the end of the year or any accounting period we know just how much to charge to each department, and of course we have the main record right here in my office for double check."

◆ ◆ ◆

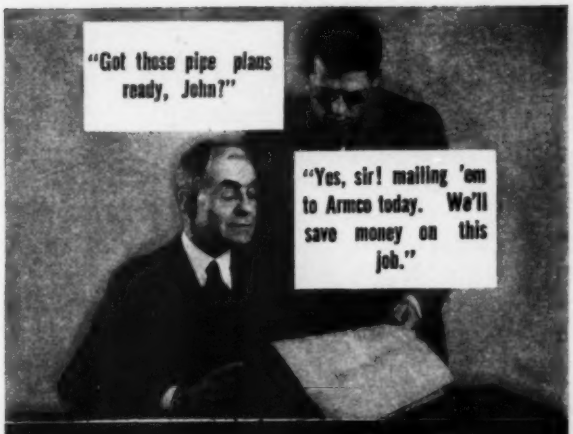
Hercules Plans New Plant

Officials of Hercules Powder Company announce that work will begin shortly on a new plant at Parlin, N. J., for the manufacture of Tornesit, the company's new protective coating material.

With the opening of this plant Tornesit will be produced in this country for the first time, replacing the material now being imported from Germany.

Tornesit is a chlorinated rubber product that is rapidly finding use in the protective coating industry because of its great resistance to acids, alkalies, fumes, and other destructive elements. Tornesit is also being used for adhesives and plastics and as an impregnating material for textiles and paper.

◆ POSSIBLE CONSTRUCTION of a wood pulp mill in Malaya is suggested by the tests being made with certain woods there with a view to producing a satisfactory grade of wood pulp, according to a recent report from Consul General Wilbur Kelbinger, Singapore. The tests have been sufficiently successful for the parties interested to make plans for procur-



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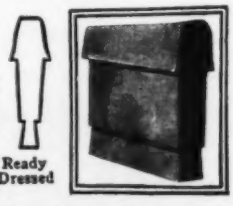

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ing the necessary capital for the project. The mill planned will have a capacity of around 10,000 tons per annum. The wood to be used is a soft tropical wood similar in grain and texture to poplar.

The Paper Industry Safety Contest

July 1, 1934 to June 30, 1935
Two Months Cumulative Scores
(As of August 31, 1934)
39 Mills Register Perfect Score

PERFECT SCORES

Division I—Paper and Pulp Mills

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	Bryant Paper Co	Kalamazoo	Michigan
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	Consolidated Paper Corp., Ltd.	Port Alfred	Quebec, Can.
	Fraser Co., Ltd.	Madawaska	Maine
	St. Croix Paper Co.	Woodland	Maine
GROUP C	Nekoosa Edwards Paper Co.	Port Edwards	Wisconsin
	International Paper Co.	N. Tonawanda	New York
	Escanaba Paper Co.	Escanaba	Michigan
	Oxford Miami Paper Co.	West Carrollton	Ohio
	Crystal Tissue Co.	Middletown	Ohio
	Consolidated Water Power & Paper Co.	Appleton	Wisconsin
	John H. Heald Co.	Lynchburg	Virginia
	*Finch, Pruyn & Co.	Glens Falls	New York
	Strathmore Paper Co.	Woronoco	Massachusetts
GROUP D	Sylva Paperboard Co.	Sylva	North Carolina
	Bergstrom Paper Co.	Neenah	Wisconsin
	International Paper Co.	Webster	Orono, Maine
	Kimberly-Clark Corp.	Lakeview	Neenah, Wis.
	Bird & Son, Inc.	Phillipsdale	Rhode Island
	Hollingsworth & Whitney Co.	Arcostock & Cobbassee	Gardiner, Maine
	International Paper Co.	Continental Div.	Ashland, N. H.
	International Paper Co.	Livermore	Chisholm, Maine
	U. S. Envelope Co.	Worcester	Massachusetts
	Spaulding Fibre Co., Inc.	New Mill	Milton, N. H.
	U. S. Gypsum Co.	North Kansas City	Missouri
	U. S. Gypsum Co.	Gypsum	Ohio
	International Paper Co.	Riley	Maine
	Hollingsworth & Whitney Co.	Abenaquis	Madison, Maine
	U. S. Gypsum Co.	Genoa	Ohio
	Spaulding Fibre Co., Inc.	Hayes	No.Rochester,N.H.
	Mead Paperboard Co.	Rockport	Indiana

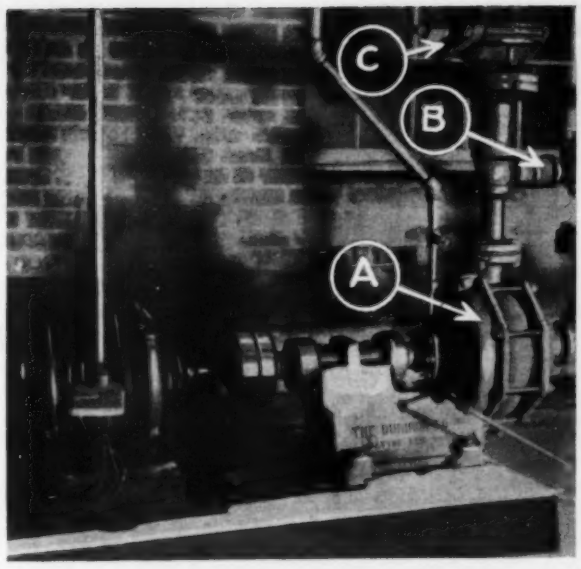
Division II—Remanufacturing

	Oxford Paper Co.	Coated Div.	Rumford, Maine
	Bird & Son, Inc.	Norwood	Massachusetts
	Container Corp. of America	35th Street	Chicago
	Continental Paper & Bag Corp.	Elizabeth	New Jersey
	Bird & Son, Inc.	Roofing	Chicago
	Continental Corp. of America	Natick	Massachusetts
	Texas Corrugated Box Co.	Dallas	Texas
	Southern Container Co.	Houston	Texas
	Bemis Bros. Bag Co.	East Pepperell	Massachusetts

IMPERFECT SCORES

	Key No.	Rank	Disabling Injuries	Frequency Rate
GROUP A	P-64	3	1	3.216
	P-27	4	2	3.939
	P-12	5	1	4.655
	P-108	6	2	5.753
	P-42	7	2	6.472
	P-13	8	2	6.548
	P-10	9	2	8.976
	P-67	10	4	11.711
	P-18	11	5	12.008
	P-28	12	7	12.629
	P-31	13	4	13.885
	P-44	14	4	16.209
	P-114	15	6	16.591
	P-95	16	4	17.874
	P-60	17	5	19.603
	P- 2	18	5	21.287
	P-102	19	9	26.237
	P-78	20	6	27.909
	P- 1	21	11	29.741
	P-87	22	10	33.892
	P-73	23	10	41.772
	P-101	24	9	43.330
	P-74	25	12	51.025
	P-71	26	16	70.560
GROUP B	P-23	5	1	5.029
	P-60	6	1	6.606
	P-70	7	1	6.638
	P-105	8	1	6.656
	P-45	9	2	10.892
	P-40	10	2	10.925
	P-32	11	2	11.104
	P-21	12	3	15.362
	P-112	13	3	19.821
	P-16	14	3	23.173
	P-46	15	3	24.365
GROUP C	P- 3	10	1	8.759
	P-72	11	1	10.450
	P-41	12	1	13.864
	P-17	13	1	15.445
	P- 5	14	1	16.250
	P-51	15	2	17.376
	P-33	16	2	25.045
	P-61	17	3	32.308
	P-75	18	3	34.817
	P-104	19	4	38.340
	P-29	20	3	39.107
	P-49	21	3	40.177
	P-48	22	4	44.473
	P-88	23	3	48.710
	P-14	24	4	59.974
	P-47	25	5	63.502
	P-77	26	7	67.124
	P-113	27	5	70.177
	P-50	28	12	165.847
GROUP D	P- 7	18	1	20.910
	P-107	19	1	24.268
	P-94	20	1	24.542
	P-99	21	1	35.515
	P-42	22	1	39.078
	P- 8	23	3	92.328
	P-98	24	5	155.087
DIVISION II	R-6	10	3	14.062
	R-9	11	1	21.722
	R-13	12	1	30.148
	*R-1	13	2	77.516

(*) No August Report.



(A) Direct-drive Duriron Centrifugal Pump
(B) By-pass to make-up tank (C) Duriron-Nordstrom lubricated valve to storage tank

Making Better Bleach *for* Smith Papers, Inc.

To save mixing time . . . to get better results . . . to reduce costs . . . Smith Papers, Inc., Lee, Mass., installed two Duriron pumps to make their bleach. The installation is mechanically efficient and free from any corrosion of equipment or contamination of the bleach.

The installation above shows one of the two 2G pumps; 3-inch suction, 2-inch discharge, mixing calcium hypochlorite bleach through a by-pass and then transferring the bleach from the make-up tank to storage.

When mixing, the pump handles 250 g.p.m., and transfers to storage 75 g.p.m. to an 80 ft. head. A Duriron-Nordstrom lubricated valve is used on the discharge line.

More complete particulars of the construction of the complete line of centrifugal pumps, both standard and self-priming, made in chemical-resisting alloys for many purposes, will be sent upon request for Bulletin No. 172.

Exclusive licensees for the U. S. for the Manufacture and Sale of the Panzl Strainer.

The DURIRON COMPANY, Inc.
445 N. FINDLAY ST. DAYTON, OHIO

DURIRON

THE IMPROVED

Chemipulp Process

★★★★★

No matter what kind of a cooking system you are using, in order to produce a uniform pulp of high quality it is necessary that a few fundamental facts always be kept in mind.

First: Thorough penetration of each individual chip must be secured before reaction temperature is reached.

Second: Equal distribution of a uniform acid at as high a temperature as possible below 110° C. must be accomplished in the digester before actual steaming is started.

Third: Maintain uniform cooking acid both during the summer and winter.

The improved CHEMIPULP SYSTEM accomplishes all of the above for under our new methods of operation, as soon as all the air has been displaced from the digester and it is solidly filled with chips and cooking liquor, the digester filling pump is continued in operation and a relatively high pressure pumped on the digester, then the side relief and top relief valves are opened and with the digester filling pump still in operation, liquor is circulated from the ACCUMULATOR through the digester and back to the ACCUMULATOR until not only all the air surrounding the chips but also the air and other inert gases within the chips has been substantially displaced by the cooking medium at a relatively high temperature. This precirculation back to the accumulator, which is accomplished before steaming is started places each individual chip in the same condition, that is, the chips are thoroughly penetrated with a hot uniform acid and the temperature and the acid concentration through the whole of the digester are the same.

When this is accomplished, there is no difficulty in cooking a digester, to maintain the temperature within 2 or 3° C. for both the top and bottom thermometers.

Actual results operating as described above have shown a steam, sulphur and limestone consumption almost unbelievably low and in addition have shown yields that approach theoretical.

Any kind of pulp desired can be cooked in this manner in a relatively short time and further the uniformity and color of the whole cook is vastly improved.

Broadly protected by patents in the North American Continent and Europe.

★★★★★

Chemipulp Process, Inc.

WATERTOWN, N. Y.

Pacific Coast Office
3311 First Ave. South
Seattle, Wash.

Canadian Agency
319 Castle Building
Montreal, Que.

TECHNICAL DEVELOPMENTS

IN THE PAPER INDUSTRY

The following abstracts are of the latest developments found in the foreign press and in the patent offices. Photostats and translations of complete articles and patents can be obtained at cost price.

◆ Testing Greaseproof Papers

Varying directly with the parchmentization of a paper is its resistance to the penetration of fats or greases. Up to the present, the two methods for determining greaseproofness are a crude blister test (carried out by heating the sheet) and the penetration of either turpentine or lard. Both of these are so inadequate that the authors (after a thorough study of their usefulness) have modified and standardized them. The resistance of a paper towards cooled lard, with its enormous unmeasurable viscosity, is naturally not comparable with its resistance to turpentine. After listing the viscosities of about 50 different natural and synthetic oily or fatty products, the authors decided upon the use of a definite compound, diethylphthalate, in place of lard or turps in standardizing the test for grease resistance. The standard apparatus, which is a brass cylinder having a side arm that permits free rotation and clamping in a suitable position is shown in Figure 1. By the use of a metal ring, and a finely threaded screw-cap, a disc of the paper to be tested may be carefully drawn tight, so that it completely closes the opening at one end of the cylinder. The paper is 30 millimeters in diameter, and is kept under tension, so that no other packing is required. At the opposite end of the rotating cylinder is a thermometer well, and this end may also be tightly sealed with a screwcap as shown in the illustration. In practice, the opening that is later to hold the paper disc is placed uppermost. This means that the thermometer well is rotated downwards, and that to the bath (or cylinder) is added 25 c.c. of diethylphthalate. Thereupon the paper disc is stretched into position, and the entire cylinder rotated back through 180 deg., and clamped in a vertical position. Below the cylinder is a mirror that may be tilted to any desirable angle, thus permitting the observer to note the changes taking place in the test sheet by watching the mirror image. The test is carried out at 20 deg. C. Papers that are not greaseproof, sooner or later show a regular sweating or droplet formation (without giving rise to a large falling drop) and the time required for this sweating or penetration to take place may be accurately measured. Thoroughly greaseproofed paper however should hold without sweating for hours or even for days. The relationships between the degree of beating, the strength of the sheet, the weight per square meter, the moisture content of the paper and the penetration were recorded, as were the differences found by exposing the rough and the smooth side of the test paper to the reagent. Usually the smooth side of a paper shows slower penetration, but differences disappear completely when a paper has become thoroughly greaseproof. The lower the temperature of the reagent, the slower the penetration, showing the influence of viscosity. Greaseproof paper that was completely dehydrated was remoistened, but showed no differences in greaseproof properties subsequently. Similarly the finished (satinage) was of no effect on greaseproof paper. The so-called blister test was standardized in an apparatus shown in Figure 2, which illustrates an electrically heated cylinder and a thermometer well that also serves in clamping the heater to its standard. The wiring is such that a temperature of 300 deg. C. cannot be exceeded. The ends of a strip of paper to be tested is held under slight tension between the thumb and index finger of each hand, or, if very small samples are used, by means of forceps. It is then placed for a brief moment against the heated cylinder. With amply greaseproofed papers, an even blister is formed, and the nature of this blister varies with the means of sheet formation. For example, up to a certain degree of beating in the Jackro apparatus, the blister test for unbleached pulp is negative. At a definite point however (which is determined by various factors in different pulps) blisters begin to appear. These blisters form despite a constant moisture content and constant weight per unit area. This then is the lower limit of parchmentization (termed Pergamentierschwelle). The blister test also shows definitely the reversibility of the plastic properties of greaseproof papers. When a greaseproof paper was dried during 22 hours at 105 deg., the blister test was completely negative. However after steaming the dry paper, blisters again formed under the conditions originally found. Further drying of the same sheet followed by resteaming gave the same results. The reversibility of the blistering properties was shown even in greaseproof papers dried at 150 deg. C. Other conditions being equal, the blister test appears to be correlated with the per cent of moisture

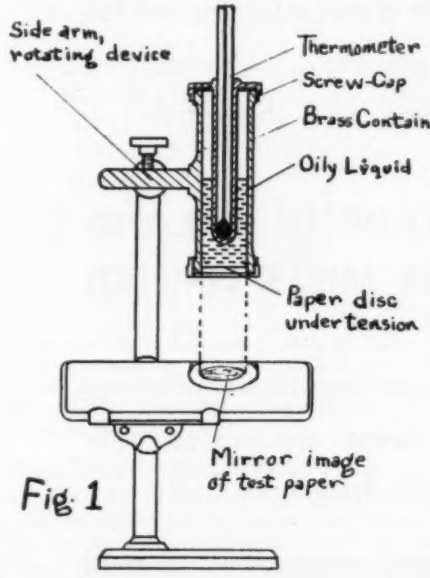


Fig. 1

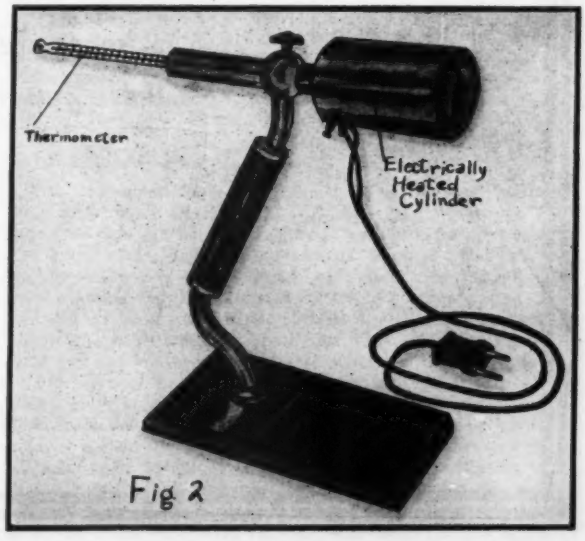


Fig 2

$500
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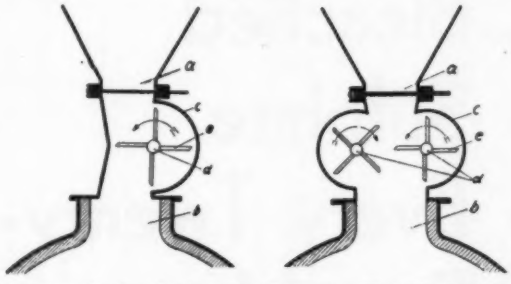
in the sheet. However paper which had been shown greaseproof by the diethylphthalate test retains its impermeability to this liquid even after thorough drying, when the blister test has completely disappeared. The blister test reappears in accentuated form when this same paper has taken up more moisture than it held originally. The two tests as outlined are therefor of importance in judging the capacity of a paper to undergo mechanical parchmentization. They show a certain parallelism, but also certain differences, for evidently the diethylphthalate test is not correlated with the plasticity of the sheet. The theoretical bases for the tests and their practical applications are discussed in some detail. August Noll and Walter Nagel. Papier-Fabr. 32, No. 24, 277-284; No. 25, 289-292 (1934).

◆ Filling Sulphite Digesters

By the use of suitably arranged flat blades, rotating around an axis, and placed between the top of the digester (b) and the chip-bin hopper (a), the speed of the outflowing chips may be increased materially. The blades (e) revolving about the axis (or axes) (d) are shown clearly in the housing (c).



A single or duplex device may be used. The illustration on the right shows a twin series, with one axle turning clockwise, the other counter-clockwise, and the revolutions so timed that the blades on the one axle are never parallel to those on the other. Feldmühle Papier und Zellstoffwerke, Akt. Ges., Stettin, and Otto Böhm, Königsberg, Prussia. German Patent No. 599,352.

◆ Surface Esterification in Paper

These preliminary experiments were carried out to attempt to decrease the hygroscopicity and to improve the electrical properties of paper. The results are tentative. Paper used in condensers was treated with the chloroanhydride of stearic acid for 3 minutes at 160 deg., until the weight increased about 144 per cent. The actual reagent used is a mixture of 10 parts of quinoline, 11.5 parts of the chloroanhydride, and 38 parts of xylene for every part by weight of paper. The reaction takes place in the absence of water. The hygroscopicity of the paper is markedly decreased, as shown by moisture content experiments. A paper which, at a relative humidity of 80 deg., contained 11.3 per cent moisture, only took up 5.7 per cent after the chemical treatment. The electrical properties of the paper, after the treatment with paraffin were considerably better than were no initial esterification had been given. However the tearing strength of the chemically treated paper suffers somewhat, despite which the authors feel that surface esterification is probably more advantageous than is coating the surface with cellulose ester lacquers. Soletschnik and Motowilowa; Bumazhnaya Prom. 12, No. 10, 39 (1933); through Papier-Fabr. 32, No. 22, 259 (1934).

◆ Colloidal Chemical Sizing Studies

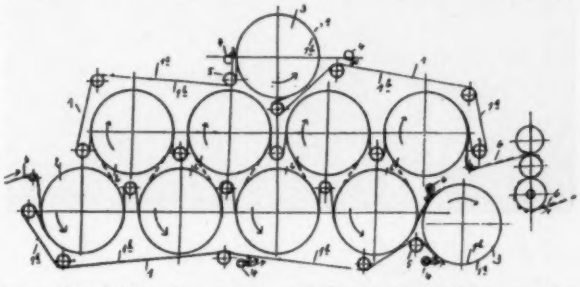
In studying the effect of electrolytes on the charge of particles and the clouding of hydrosols of abietic acid and its sodium salt, the charge was computed from the migration rates during electrophoresis, by ultramicroscopic means. The clouding effects were observed by use of a Zeiss nephelometer. The electrolytes used were KCl, NaCl, $MgCl_2$, K_2SO_4, HCl, H_2SO_4, NaOH, $AlCl_3$, $Al_2(SO_4)_3$ and $Th(NO_3)_4$. In both types of sols (i. e. the free acid and its sodium salt) $AlCl_3$ and $Th(NO_3)_4$ cause discharge. In the abietate sols treated with $AlCl_3$, the charge of the aluminum-containing particles [$(m.Al_2O_3.\ nNa_2O.xH_2O$) herinafter termed (A)] presumably determines the charge of the particles in the soap sol i. e. X(rosin)+Y(A). The abietic acid particles are coated with alumina particles. In the free abietic acid solution, the sol particles are considered strongly peptized or hydrated, probably in consideration of the powerful peptizing action of the aluminate ion, or of the negatively charged and highly hydrated complex (A). The so-called valence rule is applicable to the action of the electrolytes, both in the case of clouding of the sol and in particle charge (and for both the abietic acid and its salt). $Al_2(SO_4)_3$ however causes no discharge of the particles. This sulphate, (papermakers alum) lowers the potential of the fiber and of the rosin particles until a critical potential is reached, and the mutual repulsion is weakened. (An explanation of the failure to cause discharge in the case of $Al_2(SO_4)_3$ in contradistinction to the action of $AlCl_3$ and $Th(NO_3)_4$ is not given) Kisou Kanamaru and Takeshi Tsuchida. J. Chem. Industry of Japan, 36, 102B-110B (1933); through Cellulosechem., 15, No. 6, 74-5 (1934).

◆ Flax Chaff and Straw in Paper

Laboratory and mill experiments indicate very plainly that chaff and straw obtained from long-fibered flax may be used successfully in the manufacture of a variety of papers, the gamut of which starts with wrapping paper and ends with a high grade of writing paper. M. A. Robinoff. Material des rätebünd wissensch. Forschungsinst. der Papier-u Zellstoffindustrie., 2, 130-157 (1933); through Cellulosechem., 15, No. 5, 64 (1934).

◆ Drying and Cleaning Dryer Felts

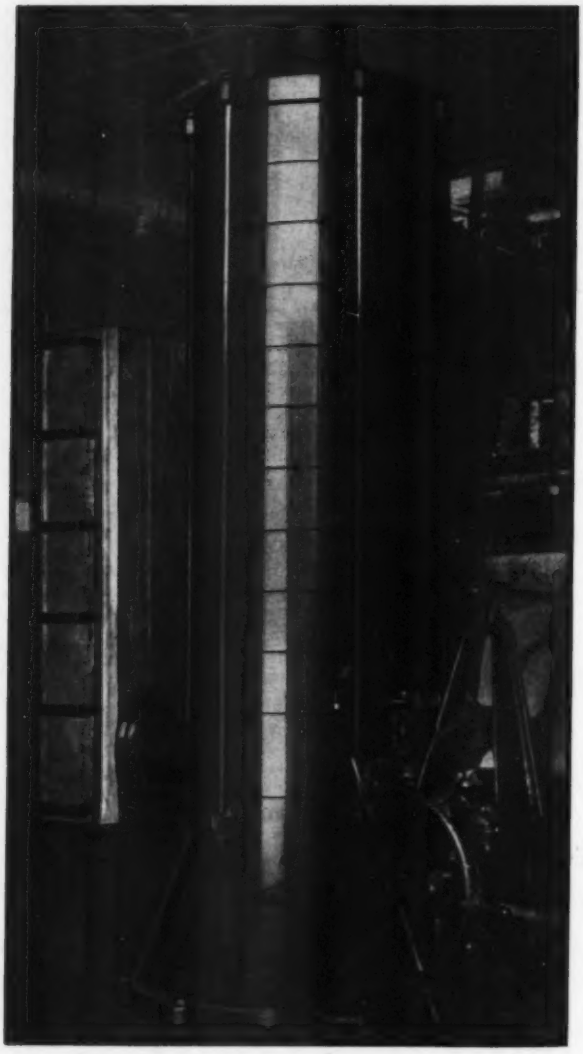
The invention seeks to prevent the premature incrustation of dryer felts, and depends on the principle that the underside of the felt (1 b) and not the side (1 a) which previously made contact with the paper sheet and the drying cylinders (2) reaches the surface of the felt-drying cylinders (3). Not only this, but the outer side (1 a) of the felt (1) is so routed



over the driers that steam and loosened particles can be removed by a suitable air blast (4) or a suction device (5). In this manner chemicals, etc., are prevented from becoming fixed in the felt, with ensuing incrustation. Another claim provides the felt driers with openings through which air may be forced under pressure. Hellmut Martin and Robert Martin, Leipzig. German Patent No. 599,353, Kl. 55d.

◆ Rosin and Fats in Pulps

The Commission on Fiber Analysis of the Association of Pulp and Paper Chemists and Engineers, in this (its 5th) memorandum gives a standardized procedure for determining the total rosin and fat content of a pulp. The solvent, dichloromethane (also termed methylene chloride) is noncombustible, insoluble in water, non-hygroscopic, and inexpensive. In contradistinction to alcohol it does not dissolve soaps, and in this respect resembles ether. The boiling point range of the commercial solvent, which is usually listed as 98-100 per cent pure is of importance, and the mean boiling point may be determined without resorting to an actual fractional distillation by the use of the Noll flask which is clearly shown in Figure 1. Into this flask the solvent is introduced up to the 50 cc. mark and the mean boiling point is the temperature recorded by the thermometer on the left after the dichloromethane has been boiling steadily for 5 minutes. The side arm of the Noll flask carries a reflux



Refining and Hydrating Sixty Tons of Bleached Sulphite Every Twenty-Four Hours

THIS is what is being done in a Wisconsin mill, and using only enough power to run one ordinary beater. One FRITZ REFINING AND HYDRATING MACHINE will do the work of many beaters and do it better. • If you want to make better paper at less cost, let us talk it over. Our recommendations for improving your operating conditions will be made without any obligation.

LOVE BROTHERS, INCORPORATED AURORA, ILLINOIS

condenser, the lower end of which is shown in Figure 1. The pulp to be examined is shredded into particles 1-2 cm. in length, or else rasped into flocks by using a standardized rasp. Any of the following three types of extractors may be used with equal success: (1) The Rademacher modification of the Soxhlet extractor [Cf. Chem.-Ztg. 26, 1177 (1902)] shown in Figure 2, in which the filter contained in the central siphoning vessel has a capacity of 250 cc.; (2) The Noll extractor [Cf. Chem.-Ztg., 42, 260, (1918)] as shown in Figure 3, in which a 250 cc. flask is used; and (3) another modification of the Soxhlet extractor (not illustrated) consisting of

Fig. 2

Fig. 1

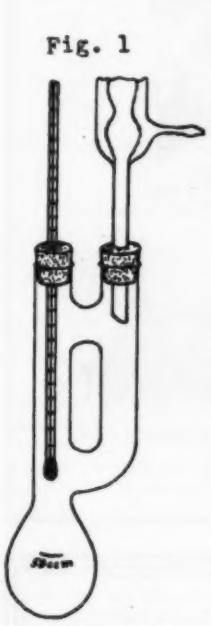
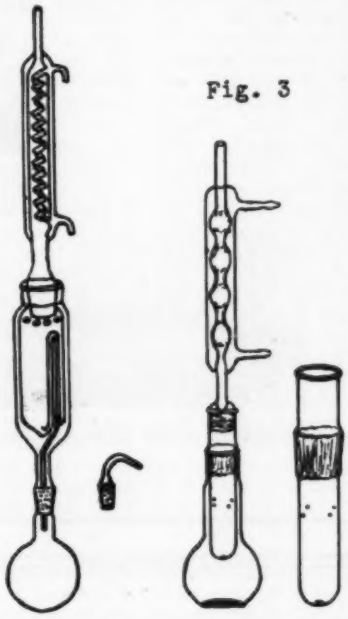


Fig. 3



a tinned copper condenser and a 130 cc. capacity siphoning device which is hung into the flask and which is ordinarily capable of siphoning 7 times per hour. This last apparatus, full details of which are given in the report was devised by Schott and Gen, of Jena. Ten grams of shredded or rasped, air-dried pulp, the water content of which is carefully determined, are placed in one of the three extractors listed above and subjected to extraction for 3 hours with boiling dichloromethane. In using the extractor shown in Figure 3, no paper thimble is used, but a layer of carefully degreased cotton wadding is laid into the lower portion of the extraction vessel prior to the addition of pulp. The extract is finally filtered and the filter paper rinsed with additional solvent. The filtrates are concentrated either by evaporation or distillation, for which purpose the ground-in glass stopper with outlet tube is shown at the right of Figure 2. The concentrated liquid and rinsings are transferred to a weighed 50cc. beaker, evaporated, and the beaker and residue dried to constant weight at 100 deg. C. The time required is usually 2-4 hours. The extractives are calculated on the bone-dry basis, and are known as di-extract. Highly reproducible results are obtained and the method has the advantage that the extraction temperature is that of the boiling solvent, an improvement over the usual Soxhlet extraction. Papier-Fabr., 32, No. 31, 345 (1934).

♦ Recovery of Solvents From Moving Paper Sheets

These three patents granted to a German firm deal largely with the recovery of solvents, especially alcohol volatilized from sheets impregnated with alcoholic solutions of synthetic resins used in the manufacture of stiff paper, etc. In Figure 1, the drying system comprises a series of chambers, (a), (b), and (c), separate and distinct from, but adjacent to each other. The paper sheet (d) to be dried and freed from solvent, passes in at (i) and finally out at (k), moving in the direction of the arrow, and passing through the various slits (e), (f), (g), and (h). Each chamber has a conduit (l) admitting air which leaves charged with vapors at the points of egress (m). The vapors are then separated from the latter. Another claim provides for a whirling motion to be imparted to the gas that serves to dry the sheet. In an earlier patent (German Patent No. 580,705; Papier-Fabr., 31, 447 (1933) a certain technique had been used in the removal of vapors from impregnated sheets. A modification of this serves as the basis for the second patent. In Figure 2, the sheet (d) moves in the direction of the arrow (a') through the drying chamber (p). The drying gas is sucked through duct (t) by the fan (u) and is introduced into the left hand partition of (p) [which in the illustration is numbered (I)]. The direction of the gas is indicated by arrows. It enters the actual drying chamber through the openings (x), and then leaves it, laden with solvent vapor through the openings (y). Supplying the right hand partition (II) is another fan (u') by means of which the dry gas is supplied through conduit (v'), through (s) and into (p) in the general direction indicated by the lower arrows, through openings similar to (y). Thence the gas, laden with vapor is conducted out through openings (x). In other words, the circulation in partition (II) is in a direction opposite to that in (I). The third patent is an addendum to German Patent No. 580,705, also dealing with solvent recovery, and is illustrated by Figure 3. Connected with one, or with several of the head chambers of the drying system is a drying cylinder or a series of drying drums. The paper sheet (F') after passing through the chamber (K) is led over the guide rolls (P) through a special chamber (N) containing an internally heated cylinder (O). At the same time the gas effecting the drying of the sheet is sucked out through (R) at the upper end, by the fan (S) and then forced downwards through the branched

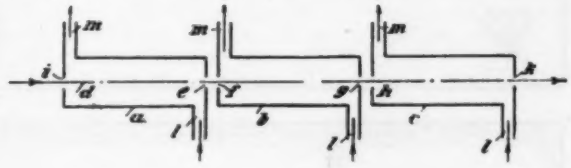


Figure 1

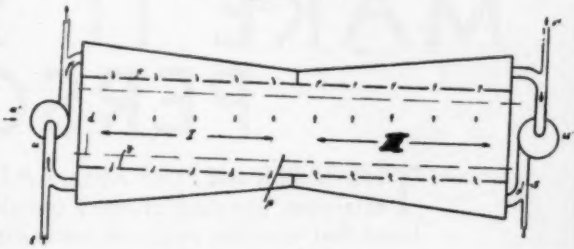


Figure 2

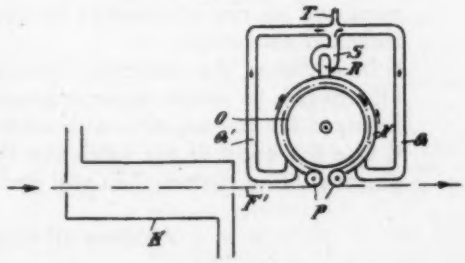


Figure 3

conduits (Q) and (Q'), so as to reenter (N) at its lower end. If desirable a part of the gas stream may be removed at the point (T), and thence led to the solvent recovery plant. Jaroslaw's Erste Glimmerwaren-Fabrik, Berlin. German Patent Nos. 598,166, 598,167, and 598,797, Kl. 55d., respectively.

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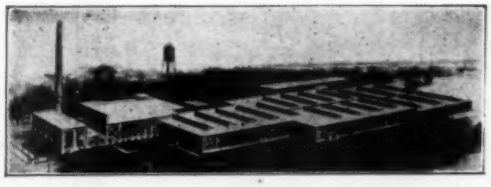

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PAPER AND PULP MILL CATALOGUE

333 N. Michigan Avenue, Chicago, Illinois

The COMMERCIAL OUTLOOK

New York, October 1, 1934.

WHILE the summer period was somewhat doleful for business in general, and fraught with much uncertainty, if not apprehension, for the paper industry, there are now numerous indications that the trade situation is commencing to shake off its dullness and is headed for broader activity and more satisfactory conditions. Since the official ending of the hot weather season, or within the comparatively short space of time of ten days, the general business position has changed very perceptibly for the better. The situation has taken on a different color, a brighter hue, with confidence returning, optimism rising and with nearly all signs pointing to decided pick-up in various lines of trade.

No less an authority than Secretary of Commerce Roper, in a statement issued in Washington several days ago, asserts that although business indications up to two weeks ago were not encouraging, latest reports reveal improvement in economic conditions. "Reports that I have received in the last fortnight justify me in the statement that business is improving," the Secretary said, and added that "despite some retarding factors, retail sales during August and the first part of September indicate consumers' goods are beginning to move forward very favorably, and I anticipate home repair work is now being estimated in very large figures."

Statistics from various quarters tend to prove that the general business and industrial condition is strongly on the mend. The export trade of the United States during August set a new high record in total value since 1930, for the same month; on all sides there are indications of a large increase in retail sales of goods, with the latest issued figures bearing out this larger merchandise movement; steel production is rising as is automobile output, while other figures relating to industrial production are on the up-curve, and price indices of most commodities—raw and manufactured—are again moving upward. The ending of the countrywide textile strike has been a helpful stimulant, and possibly is at the bottom of the distinct turn for the better in the general business condition.

Opinion is common within the paper trade that the next several months will witness good business in various lines, in which of course paper will share to its full measure. Probably the most salient indication is the steady, and fairly large, gain in the retail movement of merchandise. Reports from nearly all parts of the country tell of marked increases in local business, of larger purchases of numerous articles over the retail counter, which means that goods are moving into the hands of actual consumers, thereby depleting merchants' stocks and necessitating replenishments. Certainly, there could be no sounder nor healthier sign that the basic condition of general business is on the mend.

Reports from paper manufacturers and distributors tell of fair activity in the paper and board market. Few mills there are, according to reports, that are running on a fulltime basis, yet a broadening of inquiry and of actual demand has been recorded recently, and indications point to further considerable expansion in the market outlet over the next few months. Most paper mills—almost without exception, it can be stated—are operating on a better schedule of production than a year ago, and this despite the fact, as shown by trade statistics, that paper output thus far this year has exceeded that of 1933 by a fair margin. Moreover, the statement of a majority of paper manufacturers is that, under the protection of the codes, the paper industry is operating at a more satisfactory rate of profit, although there are those who are prone to contradict this assertion.

Production of newsprint paper in the United States in August declined 4.2 per cent from the output in August last year, but in Canada production was up 11.2 per cent, and for the two countries the output increased 6.5 per cent. This was a smaller rate of gain than July showed, production in the two countries in that month being 9.4 per cent greater than in July, 1933, according to figures compiled by the News Print Service Bureau. United States production in August amounted to 80,903 net tons, comparing with 76,184 tons in the preceding month and 84,521 tons in the same month a year ago. Canadian output reached 216,164 tons in August, against 208,238 tons in July this year and 194,262 tons in August last year. For the two countries, production totaled 297,067 tons during August, contrasted with 284,422 tons in the month preceding and 278,783 tons in the corresponding 1933 month. During August 30,223 tons of newsprint were manufactured in Newfoundland and 1,868 tons in Mexico, so that the total North American output for the month amounted to 329,158 tons.

Newsprint production in the United States and Canada during the first eight months of this year was 2,340,607 tons, against 1,889,641 tons in the similar period of 1933, an increase of 450,966 tons or 23.8 per cent. This output exceeded the eight months production in 1932 and 1931, but fell below the same time in the five years, 1926 to 1930, inclusive. Shipments from mills in both countries exceeded production during August, so that there was a reduction of several thousand tons in stocks at mills. Stocks at U. S. mills amounted to 20,601 tons at the end of August, and at Canadian mills 61,359 tons, a combined total of 81,960 tons, compared with 85,313 tons a month previously.

Mills in the United States produced a total of 201,924 net tons of paperboard in July last, compared with 224,214 tons in the month before and 283,272 tons in the similar month of 1933, according to the monthly compilation of the U. S. Census Bureau. The July output brought the aggregate for the first seven months of the current year up to 1,602,446 tons, contrasted with 1,735,849 tons in the corresponding 1933 period. New orders received by manufacturers during July were for 200,278 tons of board, against 214,236 tons in the preceding month, while unfilled orders held at the end of July called for 73,256 tons, compared with 72,990 tons a month previously. Shipments of board from mills in July totaled 179,264 tons, against 190,896 tons in the month before, and stocks on hand at mills at the close of July amounted to 71,078 tons, against 70,659 tons at the end of June last and 66,371 tons at the end of July, 1933.

◆ ◆

◆ Gears & Forgings, Inc. Reorganized

Gears & Forgings, Inc., with general offices at Cleveland, Ohio, who has been in receivership since April 1st, 1932, has affected a reorganization under the name of Ohio Forge and Machine Corporation.

This new company will operate the former Ohio Forge and Van Dorn Dutton divisions of Gears & Forgings, Inc., located on adjoining properties at Cleveland, Ohio.

Renovation of these plants and their equipment is being made, additional equipment being installed to increase facilities and cover a wider range of service.

The standard line of speed reducers formerly marketed under the G & F trademark will continue to be manufactured in the Cleveland plants as before.

The new company will be equipped to handle all types of gearing in a wide range of sizes, power transmission equipment of all descriptions, a full line of speed reducers from fractional horsepower to 500 horsepower, special machinery, drop forgings and general forging.

Sales offices will be maintained as formerly in all principal cities.

◆ MERCO NORDSTROM VALVE CO., a subsidiary of the Pittsburgh Equitable Meter Co., Pittsburgh, Pa., announces that W. R. McLaughlin has joined its sales organization.

Two Kernels In this Nut

Certainly Orr weaves fine felts but so do Orr's competitors. Paper mill felts have to be good or they are no good.

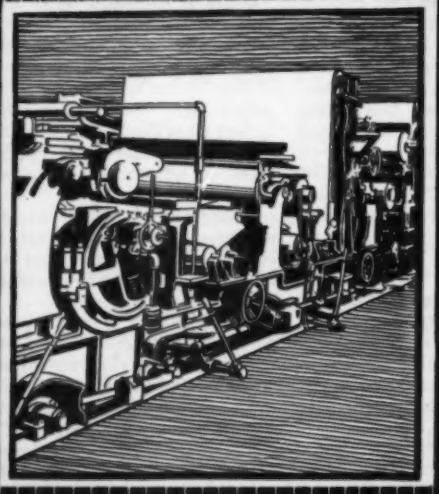
Rather than emphasize quality, Orr would stress the importance of adopting the felt that will best meet the need—and there is such a felt.

Avoid the felt that is just about right. Consult your Orr representative and between the two of you, settle on the felt that is exactly right.

That is one of the kernels in the nut. The other is the precautions you take lest your felts be injured on the machine or during washups.

An Orr representative would be glad to call; or write to

The Orr Felt and Blanket Company
Piqua, Ohio.



ORR FELTS

ADDITIONS

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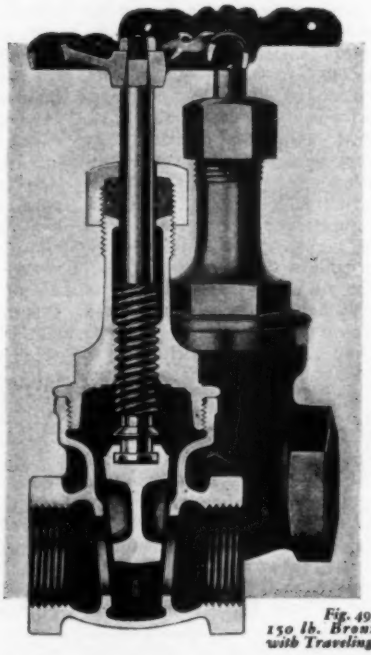

Fig. 49.
150 lb. Bronze Gate with Traveling Spindle

New Traveling Spindle Valves offered for various pressures

NOW, when you want Bronze Gate Valves with a Traveling Spindle you can specify "Jenkins". New additions to the Jenkins line include this type of Gate, with both screwed and flanged ends, for various working pressures. Fig. Nos. 47 and 48 are for 125 lbs. steam or 200 lbs. Oil, Water, Gas. Fig. Nos. 49 and 50 handle 150 lbs. steam or 225 lbs. Oil, Water, Gas.

These new Gates fully conform to Jenkins' standards and have many fine features, which assure long and satisfactory service. All bonnet threads are in contact with the spindle *at all times.* An extra large stuffing box holds more packing. A double-faced solid wedge and precision machined seating surfaces assure tight closure. Wedge is entirely out of the line of flow when valve is fully open.

You Can Meet Practically Any Need from the Complete Jenkins Bronze Gate Line—Data on recent additions to the line will be found in a supplement to the Jenkins No. 23 Catalog which will soon be ready for distribution. Write for it to be sure that your name is on our list.

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Jenkins Valves

BRONZE — IRON — STEEL SINCE 1864

Domestic RAW MATERIALS

◆ Old Paper

A change has been made by the NRA in Washington in the basis of fixed minimum prices on bulky grades of waste paper, whereby the established minima promulgated a little more than a month ago, or, to be exact, on August 21, now constitute sales prices within the trade as well as to consuming mills, minus fixed differentials set up by NRA decree. At first the minimum prices of $8.50 a ton on folded news and $6.50 on mixed waste paper were bases fixed for sales to mills f.o.b. packers' plants; now these prices also apply to transactions in these grades of waste paper within the trade or between dealers, less differentials of $1 a ton on folded news and 50 cents per ton on mixed paper. In short, packers and dealers are no longer permitted to sell to anyone in the trade at less than $7.50 a ton for folded news and $6 for mixed paper ex packers' plants. This revision in the minimum price basis was made on September 25, on which date the NRA mandate was signed by the Administrator.

The price fixing set-up in waste paper has slowed down the market appreciably. Buyers in general have held aloof, including board manufacturers who evidently are waiting while watching the effects of the price control program. There are plenty of signs that supplies are backing up; that there are large stocks in dealers' hands, and what the outcome will be is a question. The higher grades of waste are in restricted demand as well. New York dealers are reported asking around 2.15 cents a pound for No. 1 hard white shavings, 1.80 cents for No. 1 soft white shavings, 2.75 cents for hard white envelope cuttings, 1.35 cents for white ledgers, 1.10 cents for old No. 1 kraft paper, 1.25 cents for white blank news cuttings, 60 to 65 cents per hundred pounds for heavy books and magazines, and 40 to 45 cents a cwt. for old corrugated boxes.

◆ Papermaking Rags

Signs point to a moderately active demand prevailing for some grades of papermaking rags. As a general thing, paper manufacturers are buying in very reserved fashion; seldom are they entering the market as buyers except when they are actually in need of supplies, and even then they are mostly confining orders to quantities sufficient to cover definite requirements. In short, paper manufacturers seemingly are exerting every effort to keep their inventories in raw material down as low as practical, and, apparently feeling that ample supplies of rags exist in dealers' hands should they suddenly find their needs enlarged, are letting dealers "hold the bag" by limiting purchases to bare requirements.

A feature of the rag market is that the highest grades of rags and the lowest are in best call. There is fair demand for some descriptions of new cuttings, more particularly new No. 1 white shirt cuttings which are perhaps the highest grade of cotton rags used for papermaking, and also a steady movement of roofing rags, which constitute the lowest quality of rags for paper manufacture. New No. 1 white shirt cuttings are reported available at 6 to 6.25 cents a pound f.o.b. dealers' shipping points, fancy shirt cuttings at 2.50 cents, new soft unbleached muslins at 6.75 cents, washables at 1.75 cents, new blue overall cuttings at 4.25 cents, bleached canton flannels at 5.50 cents, light silesias at 4.25 cents, black silesias at 3.25 cents, khaki cuttings at 3.75 cents, and light flannelettes at 4 cents. New linen cuttings are selling freely around 10.50 cents a pound for white, and 10 cents for grey linen.

In old rags, probably the principal activity is in No. 1 repacked old whites, which are moving both to domestic paper mills and for export. In fact, reports say that substantial quantities of these rags are being shipped out of the country, especially to the British market. These rags are quoted at between 2.50 and 3 cents a pound f.o.b. dealers' points, depending on quality of packing. Old thirds and blues are little wanted and prices are largely nominal at about 1.20 cents a pound for repacked grade at shipping points, while twos and blues are reported offered to paper mills at 1.40 cents. Roofing rags are bringing up around 1.10 cents a pound f.o.b. shipping points for No. 1 classification stock in the East, and 80 to 85 cents per hundred pounds for No. 2 roofing.

Rag dealers are putting stress on the restricted amounts of rags now coming into the market. It is asserted that an actual scarcity of mixed rags prevails, and that as a result sorters are not producing usual quantities of roofing and other old rags, and new cutting graders assert incoming supplies from clothing factories in recent weeks have fallen far short of normal.

◆ Pulpwood

Pulpwood is in steady demand and quotations are firm with an upward tendency. Canadian wood is reported quoted delivered in the Watertown, N. Y., district at $12.50 for four-foot peeled, $13.50 to $14 for handshaved and $15.50 for two-foot rossed.

◆ Mechanical Pulp

After ruling comparatively sluggish for a time, the groundwood market suddenly emerged from its seeming lethargy a few days ago when producers in Canada in some instances ceased offering owing to water conditions and when it was rumored that certain large consumers were short of mechanical pulp. Prices firmed up quickly, and Canadian groundwood which previously was available at $20 or less per ton f.o.b. grinding mills in the Dominion was advanced to $22 and higher, with domestic pulp prices strengthening in proportion. Quotations now are about $27 a ton ex dock New York or other American Atlantic ports on Canadian groundwood, with reports of some sales at $28, while domestic groundwood is reported held at $27 or $28 f.o.b. pulp mills or approximately $30 to $32 delivered paper mills.

◆ Rope and Bagging

Reports say that paper manufacturers are exhibiting a little more interest in old manila rope, but that the market has as yet failed to develop actual improvement. Rope prices are on the easy side despite dealers' assertions that available supplies are light. No. 1 domestic manila rope is reported offered at 2 cents or less per pound at shipping points, and foreign old manila at 1.90 cents ex dock New York. Old strings, particularly soft jute and old sisal, are in relatively good demand at price levels of 1.50 cents or thereabouts for the former and 1.25 cents for the latter. Bagging is rather quiet although papermakers are placing occasional orders. No. 1 scrap burlap is around 1.15 cents a pound at shipping points, and roofing bagging 65 to 70 cents a hundred pounds.

◆ Chemicals

Papermaking chemicals rule generally steady quotably. Bleaching powder is 1.90 to 2.10 cents a pound in drums f.o.b. works. Alum is quoted at 3.25 to 3.50 cents a pound for lump, around 3.50 cents for ground and 3.60 to 3.90 cents for powdered. Casein prices tend higher at 12 to 12.50 cents per pound for domestic; caustic soda is 2.60 cents for the 76 per cent solid, and soda ash 1.23 to 1.30 cents a pound for the 58 per cent light in bags at works.

◆ Chemical Pulp

Most of the activity in the domestic chemical wood pulp market centers on deliveries against contracts or back orders, according to reports, it being stated that current demand is on the short side decidedly, with a large majority of paper mills refraining from buying. Apparently consuming mills are well supplied with pulp, in most cases at any rate, and owing to the uncertainty existing in the paper market, are not much disposed to add to their raw material stocks unless more or less obliged by necessity. Prices of pulp are holding to stationary levels. Prime bleached sulphite is 2.75 cents to somewhat higher, depending on quality, per pound ex dock Atlantic seaboard basis, while unbleached sulphite is 2.10 to 2.20 cents for ordinary prime grades and 2.25 to 2.30 cents for extra qualities. Domestic kraft is quoted at 1.75 to 2 cents a pound f.o.b. pulp mills, and bleached soda pulp at 2.50 cents delivered book paper mills.

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DO NOT CROSS THE WHITE LINE

A WHITE LINE is painted on roads to make cars going in opposite directions keep on their own side and avoid collisions. ¶ There was a time when the salesman who sold paper and the business man who used it, in the form of printing, acted as though they were going in opposite directions and had a white line painted between them, to keep each on his own side of the road. Then, gradually the paper merchant came to see that he was not merely a wholesaler who dumped cases on the sidewalk, but that he performed an important function, that he served every other business man in his community, and could serve them better, the more he knew of their needs. ¶ The printer learned to appreciate that the merchant helped him not only in making paper available, but in selecting the best paper to supply for a business purpose. ¶ Hammermill has helped to bring about this better understanding and closer cooperation between merchant, printer and consumer. Hammermill is proud of the merchants who are agents and distributors for Hammermill Papers and believes that the service they render is winning broader recognition from business men year after year. ¶ All of us, mill, merchant, printer and consumer are traveling the same way on the same road, and there is no need of a white line between us or danger of collision.

HAMMERMILL PAPER COMPANY, Erie, Penna.

Import and Export MARKETS

IMPORTS

◆ Wood Pulp

There have been significant developments in Europe which may have important bearing on the foreign wood pulp situation in the future. At recent meetings, chemical pulp producers in northern and central European countries agreed to adhere to the program which has been in force for the last couple of years seeking to stabilize the pulp market through the regulation of output. Curtailment of sulphite production will be continued during the balance of this year and throughout next year, and the European manufacturers intend to further cut their output should market conditions warrant. Also, they will cooperate fully with the American trade in the effort for market stabilization. At the same time, the European producers, or at least some of them, withdrew from their agreement exercising control on prices of chemical pulp sold to European-consuming countries, some of the Continental manufacturers declining to longer abide by this pact. This in no way concerns the American market, and, in fact, it is reported that Scandinavian mills will continue the agreement relating to European sales.

The assurance that producers in Europe will maintain prices quoted to the United States, and heartily cooperate with the trade here for market stabilization, has been creative of a somewhat steadier market tone in imported pulp, even though demand from consuming quarters continues decidely slow. A majority of paper and board manufacturers are engaging in very limited buying, as has been their wont for some months past, and evidently being enabled to follow this policy because of having ample stocks on hand or enough supply on order to cover present or immediate future requirements. Other papermakers, apparently not so well supplied, are purchasing in an occasional manner, both spot pulp and forward shipments from abroad, but aggregate demand is far under anything approaching normal for this time of the year. Uncertainty in the paper market, possible exchange differences, and the general reluctance to stock up raw material are factors contributing to the quiet market condition, yet with the situation seemingly clearing and with recent advices from Europe of a notably reassuring nature, pulp importers and agents are expecting a broadening of demand and a general improvement in market activity.

No changes of much consequence have been recorded in quotations on foreign pulp. Bleached sulphite of prime quality is 2.75 cents upwards per pound ex dock American Atlantic seaboard, and prime strong unbleached sulphite 2.10 to 2.20 cents for the ordinary grades, with easy bleaching and Mitscherlich sulphites 2.25 and 2.30 cents. Prime Swedish kraft pulp is quoted around 1.80 cents ex dock New York or other Atlantic ports, with some supply available down to 1.75 cents though with the extra desirable brands of kraft held at 1.90 cents and higher. There is some reselling of pulp going on, and buyers are succeeding in picking up spot lots in some instances at prices under the recognized quotational bases, but it is asserted that the tonnage paper mills are selling is small, at best.

Groundwood prices are firm, and tending upward. Prime dry is $22 to $23 per short ton ex dock Atlantic seaboard, and moist groundwood approximately $1 a ton cheaper.

Imports of wood pulp into the United States in July showed an increase over the preceding month, reaching a total of 133,956 long tons of chemical pulp of a value of $5,321,655, according to official U. S. Department of Commerce figures, compared with 122,274 tons of a declared value of $4,970,567 imported in June this year, and 159,463 tons of a value of $5,283,519 in July last year.

Groundwood imports in July amounted to 18,783 long tons, valued at $379,379, against 9,867 tons of a value of $191,363 in the preceding month, and making a total for the first seven months of this year of 88,613 tons of a value of $1,672,777, contrasted with 81,425 tons of a value of $1,372,414 in the same time of 1933.

◆ Paper Stock

Imports of rags for papermaking into the United States in July amounted to 10,788,572 pounds, valued at $163,925, compared with 10,342,806 pounds of a declared value of $121,899 in the preceding month, and making a total for the first seven months of the current year of 66,347,298 pounds of a value of $842,827, against 73,256,496 pounds of a value of $525,552 in the similar time last year, according to U. S. Department of Commerce statistics. Miscellaneous paper stock imports, comprising old rope, bagging, waste paper, etc., were 3,049,892 pounds of a value of $44,628 in July last, bringing the total for the seven months this year up to 34,163,640 pounds of a value of $505,250, against 54,868,767 pounds of a value of $513,518 a year ago in the same period.

◆ Paper

Paper importations into the United States registered a decrease in total value during July as compared with the preceding month, reaching an aggregate of $7,741,586, according to U. S. Department of Commerce figures, contrasted with $7,891,223 in June this year, and $7,039,154 in July last year. On the other hand, imports in the first seven months of the current year showed an appreciable advance, totaling in value $49,499,851, against $41,379,664 in the same time of 1933. Newsprint comprised the great bulk of the July imports, amounting in value to $6,887,951, compared with imports valued at $6,283,615 in the similar month last year, while cigarette paper of a value of $365,045 was the next most important item, against $271,911 in July, 1933.

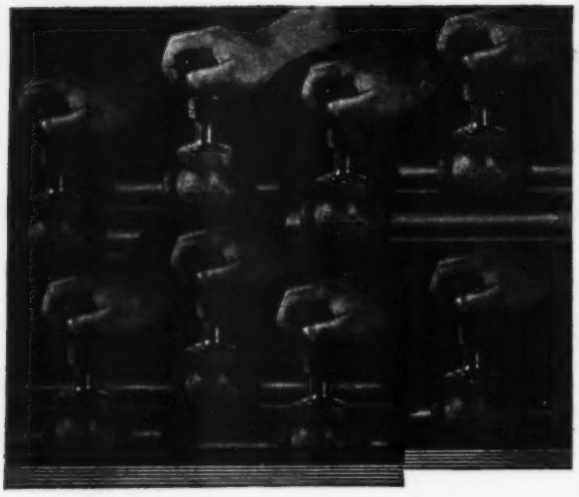
EXPORTS

Exports of paper and paper products scored a gain in total value during July as compared with the month before and also with the same month last year. According to U. S. Department of Commerce figures, exports from the United States amounted in value to $1,544,864 in July last, against $1,363,802 in June this year, and $1,259,668 in July a year ago. Paper exports during the first seven months of the current year were valued at $10,434,338, showing an appreciable increase over shipments of a value of $7,802,469 in the corresponding period of last year.

Newsprint paper exports from the U. S. in July were valued at $9,556, compared with $31,824 in the same 1933 month, while uncoated book paper exports reached a value of $95,551, against $57,535 a year ago. Exports of wrapping paper were valued at $148,039 in July, against $98,933 in the same month last year; of writing paper, $95,035, against $54,483; of tissue and crepe paper, $49,131, against $48,545; of blotting paper, $17,642, against $17,821; of sheathing and building paper, $11,666, against $18,372; of toilet paper, $41,398, against $53,790, and of surface-coated paper, $97,754, compared with $52,719.

Exports of boxboard amounted in value to $66,111 in July, contrasted with $134,757 in the same month a year ago, while other paperboard shipments were valued at $91,326, against $54,760.

Exports of paper base stocks, including wood pulp, rags, etc., from the United States in the first seven months of this year were valued at $3,761,960, compared with shipments of a declared value of $1,890,620 in the similar period of 1933.



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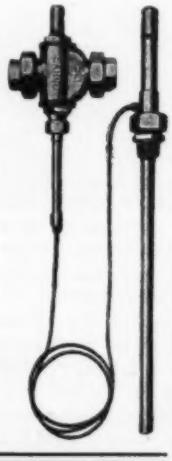

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